4.0 AFFECTED ENVIRONMENT

This section of the EA discusses aspects of the environment that potentially may be impacted by Implementation of the Land Use Plan on the Installation. The following description of the affected environment relies heavily on recent Installation EAs and Environmental Baseline Surveys (EBSs). Fort Detrick is located within the northwest portion of the City of Frederick in Frederick County, Maryland (see Figure 4-1). Relevant aspects of the affected environment (baseline conditions) are discussed below by environmental attribute area.

As discussed in Section 2.5, a number of projects are either approved or contemplated over the next five years at Fort Detrick. More detailed discussions of projects, which have undergone NEPA review (Approved Projects, see Section 1.4), are found in the documents referenced in Section 1.3.

4.1 LOCATION AND LAND USE

4.1.1 Adjacent Land Use

As Federal government property, Fort Detrick is not subject to local zoning laws. Although land use at Fort Detrick is not regulated by the City of Frederick or Frederick County, local land use patterns, and future plans for local development are potential considerations. The compatibility of land uses on the Installation and those of the city and county is an important consideration for future development of the Fort Detrick/Frederick area. The following sections describe adjacent land uses of Frederick County and the City of Frederick relative to Fort Detrick.

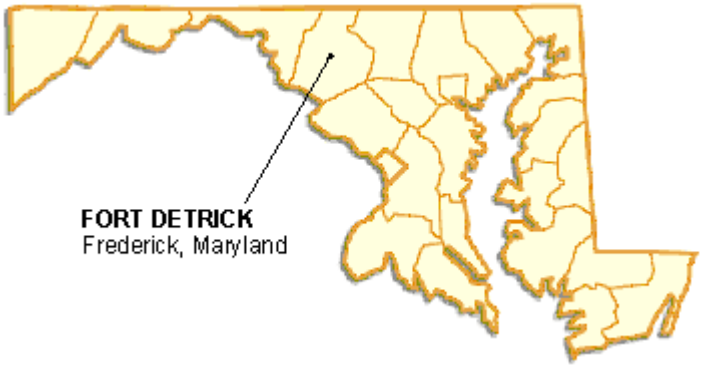

Figure 4-1. Location of Fort Detrick, Frederick, Maryland.

4.1.1.1 Frederick County

Frederick County is divided into eight planning regions that comprise geographically distinct land areas. The County is located in the Frederick Region, which is bordered by the Monocacy River to the east, the Catoctin Mountains to the west, Little Hunting Creek to the north, and Ballenger Creek to the south. Land use and development for the county is guided by eight regional plans. Fort Detrick is described in the *Frederick Region Plan*, which provides

recommendations for land use through the year 2045 (Frederick County Department of Planning and Zoning, 2002).

Frederick County encompasses 665 square miles of land. Of this total, 79.7 percent is used for agricultural/woodland, 10.3 percent for residential, 5.4 percent for parkland and open space, 2.5 percent for utilities and government land, 1.3 percent industrial and limited industrial land, and 0.9 percent for commercial land (Frederick County Department of Planning and Zoning, 1998). Residential land use has increased in recent years, primarily at the expense of agricultural land. The Frederick County Department of Planning and Zoning describes land use designations for the county to direct future growth. These land use designations are Agricultural, Undeveloped, and Woodland, Residential, Commercial, Industrial/Employment, Institutional, and General. Land use designations are maintained through the use of zoning regulations. Zoning establishes specific requirements for use, density, etc. within a designated area (Frederick County Department of Planning and Zoning, 2002).

According to the *Frederick Region Plan*, Fort Detrick is classified as Institutional. This designation includes a diverse array of public and quasi-public land uses. Unlike other land use designations, the county does not have separate institutional zoning districts. Therefore, the underlying zoning for Institutional areas is based on the nature and location of the area (Frederick County Department of Planning and Zoning, 2002).

Fort Detrick shares common borders with Frederick County on the north side of Area A and along the northwestern boundary of Area B. The Clover Hill subdivision occupies the area immediately north of Area A and is zoned Low Density Residential with three units per acre (i.e., R-3). The land surrounding this subdivision is zoned for Low Density Residential with one unit per acre (i.e., R-1). Land uses on Fort Detrick, adjacent to this area, are currently dominated by agriculture/open fields.

4.1.1.2 City of Frederick

The City of Frederick covers 20.8 square miles. The *City of Frederick Comprehensive Plan,* which was last revised in 1995, guides land use and development within the city limits. The City of Frederick is currently in the process of updating its Comprehensive Plan and will have a draft version available by the end of 2003. This plan is being developed for the efficient use of land, protection of sensitive areas, conservation of natural resources, and cost-effective infrastructure planning in Frederick. Land use regulations and zoning districts are utilized to implement planned uses of the land within the city and potential annexed lands. According to the Comprehensive Plan, there are six broad land use designations for areas within the city and potential annexed lands. These designations are Conservation, Agricultural/Rural, Residential, Commercial, Employment, and Institutional. The Conservation and Agricultural/Rural land use designations are considered under the potential annexed lands category. The Residential, Commercial and Employment designations are further subdivided into different types or intensities (City of Frederick Planning Department, 1995a).

According to the 2002 *City of Frederick Growth and Development Report*, land use within the City includes four land use designations distributed as follows: 65 percent is devoted to residential uses, 17 percent to institutional uses; 12 percent to employment uses (e.g., office and office research), and 6 percent to commercial uses (City of Frederick Planning Department, 2002).

Fort Detrick is located approximately 1.5 miles northwest of downtown Frederick and occupies the northwest quadrant of the city. The 1995 *City of Frederick Comprehensive Plan* characterized Fort Detrick as Institutional although the Installation has many attributes of an industrial/office research activity (City of Frederick Planning Department, 1995a).

Land uses in the areas surrounding Fort Detrick have not changed significantly during the past eight years and are essentially as described in the 1995 plan. Areas adjacent to the northern, southern, and eastern borders of Area A are predominately classified as Low Density Residential with a few small sections of High Density Residential (see Figure 4-2). Frederick Community College is adjacent to the northeast corner of Area A and is designated as Institutional. Areas along Carroll Creek, which border Area B to the south and east, are designated for Conservation. Areas to the north and west of Area B are predominately designated as Low Density Residential areas, which includes the Sandigan subdivision. In addition to Conservation areas, the land between Area A and Area B includes areas designated as Office/Neighborhood Commercial, Institutional (e.g., County Health Department, Citizens Nursing Home), Limited Industrial, General Commercial and Residential (subdivided into low, medium, and high densities). City and county roads border the Installation in several areas creating a physical barrier between land uses on the Installation and those of adjacent off-site areas (see Figure 4-2) (City of Frederick Planning Department, 1995a, 1995b; Bennett, 2003a).

4.1.2 Fort Detrick Land Use

4.1.2.1 Installation Master Planning

In accordance with AR 210-20, *Master Planning for Army Installations* (1993), Fort Detrick maintains an active planning program. Fort Detrick developed an *Installation Master Plan* (IMP) (1984) to guide its land use and development. The goal of the IMP is to provide a comprehensive plan to direct future development and efficient management of limited resources. In addition to land use, the IMP also addresses areas of concern such as environmental protection, transportation, natural resources, and fire/safety issues. The April 2003 Land Use Plan is the current Land Use Plan for Fort Detrick. This plan has been extensively modified over the years by decisions of Installation Commanders, who**,** in concert with the U.S. Army Medical Command, have controlled many aspects of the land use planning decisions for Fort Detrick. Currently, land use control is shifting to higher HQ level within the Army (Army Chief of Staff for Installation Management [ACSIM]). Changes in the planning process typically occur with modification to the Army's regulation on Master Planning (AR 210-20).

The Installation Real Property Planning Board (RPPB) advises the Installation Commander on changes to the Master Plan. This keeps planning on the Installation up-to-date. AR 210-20 requires that all Army Installations maintain a planning board. The Fort Detrick RPPB is comprised of representatives from the command, operational, engineering, and planning divisions of the Installation, as well as the tenant activities. The board meets regularly to evaluate the progress of master planning documentation, approve new construction sites, and review the progress and status of major construction projects. All major construction projects

are initiated after approval by the Fort Detrick RPPB and MEDCOM. Currently the ACSIM, through its Installation Management Agency (IMA), is taking on many of the functions previously provided by major commands, such as MEDCOM. The Real Property Planning Board, Working Group (RPPB-WG) was recently created to act on behalf of the RPPB to resolve the day-to-day, non-controversial planning issues on the Installation and to advise the Board on major decisions.

Fort Detrick is currently developing new revised component documentation as part of the Installation's comprehensive master plan. These components are being revised to reflect new and changing mission requirements. It is expected that the planning process on the Installation will produce significant new revisions to the Master Plan that will be part of 5-year review and revision cycles. As the Installation's Master Plan keeps pace with changing mission requirements, its primary value will be in guiding the Installation's future quality of life, growth, and development (Bennett, 2003a).

4.1.2.2 Existing Land Use

Rapid expansion of the Installation during and following WWII strongly influenced existing land use. Facilities constructed during this time were situated based on need, economics, and expediency rather than from an organized land use development plan. Many of the temporary structures constructed during this time period still exist on the Installation. Since WWII, land uses have typically been determined according to use, compatibility, and utility support. Recent trends in upgrading facilities at Fort Detrick include abandoning and demolishing the temporary WWII structures (Bennett, 2002).

Fort Detrick consists of four non-contiguous parcels of land identified as Areas A, B, and C (two parcels). Area A consists of approximately 728 acres and is the most intensively developed section of Fort Detrick (see Figure 2-4) (Federline, 2003b). Facilities located in Area A include four mission areas: the Military Community (housing, recreation, conference center); Strategic Communications (operations); Research (Public Health Research Campus and BioMedical Research Campus); and the Joint Medical Logistics Complex (Bennett, 2003a). Non-developed areas in Area A are predominately occupied by open lawns and stands of trees (STV, Inc., 2003a). Area B consists of approximately 399 acres and is used for agricultural research, animal grazing, animal maintenance, training for the Flair Army Reserve, antenna facilities, and also contains a sanitary landfill (see Figure 2-5). Area C is exclusively used for industrial operations and includes two small tracts covering 16 acres of land located along the west bank of the Monocacy River, east of Area A. One 7-acre parcel of Area C contains the water treatment plant (WTP) which serves the Fort Detrick population. The second parcel is a 9-acre tract of land one-quarter mile downstream from the WTP containing the Fort Detrick wastewater treatment plant (WWTP). Potential environmental and land use constraints for Fort Detrick are discussed in Section 4.23.5.

Existing land use at Fort Detrick can be categorized into 16 different land use types:

- Administrative
- Agrifield
- Community Facility
- Family Housing
- Grazing Area
- Landfill
- Maintenance
- Medical and Dental
- NCI-Frederick
- Open Buffer Zone
- Operations
- RDT&E
- Recreation
- Training
- Troop Housing
- Utility

Administrative

USAG headquarters and associated administrative facilities are centrally located adjacent to the parade ground in Area A. The location of the headquarters building northwest of the intersection of Ditto Avenue and Schreider Street makes the facility highly visible and easily accessible. In general, administration activities at Fort Detrick are located in the vicinity of the parade ground and along Chandler Street, portions of Doughten Drive, and portions of Porter Street. This area also includes other tenant activities and several community service and recreational facilities (e.g., library, post exchange, running track, and commissary). Individual tenants and their administrative facilities are dispersed throughout Area A.

Agrifield and Grazing Areas

USDA agricultural facilities and open land occupy the central and eastern portions of Area A. Open land is the dominant land use classification in Area B. This land is currently occupied by pasture/paddock. The USAMRIID LARF is also located in Area B. For the purposes of this EA, agricultural and open lands are considered as a single land use classification.

Community Facility and Medical and Dental

Community services support both the residential and workforce populations of Fort Detrick. These Installation services include the Community Center, the Youth Center, the Commissary, the chapel, the library, the PX, the dry cleaner, and the barber shop. Community services are located throughout Area A. Several community service facilities are located centrally along Porter Street west of the Main Gate (e.g., chapel, library, PX). Other facilities are located adjacent to the main family housing area (e.g., Youth Center). The remaining community service facilities are dispersed throughout Area A. The Barquist Army Health Care Facility is located on Porter Street across from the UEPH area.

Family Housing and Troop Housing

Fort Detrick provides on-site housing for some of its military personnel. Permanent duty personnel housing consists of 191 family units: 161 enlisted quarters and 30 officers' quarters. Transient personnel facilities include 5 guest quarters, 16 visiting officer quarters, and one distinguished visitor apartment. The military barracks space includes approximately 300 units in Buildings 1430, 1674, and 1681. The main family housing areas are located north of the central built-up portion of Area A, with the largest housing area located north and west of Ditto Avenue and Stark Street, between NCI-Frederick and USDA. Traffic and noise are kept to a minimum as

no major roads transect the housing area. Residents have easy access to the Installation's community and personnel services from the major family housing areas. One small family housing area is located on the northeast corner of Ditto Avenue and Sultan Drive and is reserved for the Deputy Installation Commander. The Nallin Farm House is another small housing area and is reserved for the Installation Commander.

On-post UEPH consists of a one 3-story barrack containing approximately 56 spaces (Building 1430) and five 48-unit barracks (Buildings 1533-1538) (Federline, 2003a). Occupancy rates for these units range from 75 percent to 88 percent (Cole, 2003). Building 1430, currently used for UEPH space, will become available for renovation following completion of the FY 2003 barracks complex located in the southern area of Fort Detrick (STV, Inc., 2002). The proposed conversion and renovation of Building 1430 will be for administrative space of USAMRAA and USAMMDA (STV, Inc., 2002).

The Unaccompanied Personnel Housing for Officers (UPHO) and the Senior Enlisted Bachelors Quarters (SEBQ) are located in the southwest portion of the Installation. These smaller housing areas are situated close to community facilities, personnel services, and recreational areas.

Landfill

The Fort Detrick Municipal Landfill is located in the northwest portion of Area B. Although approximately 61 acres are reserved for the landfill by state permit, the existing landfill occupies approximately five acres. The landfill area is mostly surrounded by agricultural research and open land.

Maintenance

The majority of the maintenance and storage functions of DIS are included in the industrial operations land use category. Most of the industrial activities at Fort Detrick are concentrated in the southwest portion of Area A. The main administrative facility for DIS (Building 201) is located at the southwest corner of Area A. Two salt domes, a sewage holding tank, fuel oil tanks, several storage buildings, and the central steam plant (Building 190) are also located in the southwest portion of Area A. The SSP (Building 375) and the Incinerator Facility (Building 393) are located along the western boundary of Area A.

The separation of these facilities creates some inefficiency of industrial operations. The location of the DIS compound at the west end of Porter Street causes some traffic congestion. Although the DIS compound is located away from the main traffic area, industrial activities conducted at the facility generate a continuous flow of vehicles and equipment to all areas of the Installation.

National Cancer Institute at Frederick

NCI-Frederick, a division of the National Institutes of Health (NIH) is a legally separate entity that owns and occupies approximately 111 structures on 68 acres of land in the southwestern portion of Area A. Communication between USAG and NCI-Frederick is limited to matters such as roadway and utility maintenance, cost sharing for common services, and common technical problems that require coordination by both parties. USAG does not have jurisdiction over NCI-Frederick operations. However, USAG does provide NCI-Frederick with the necessary utilities (e.g., sewer, water) through an Interagency Support Agreement. NCI-Frederick has no responsibility for operations and maintenance of these utilities outside the confines of their buildings (USAG, 1998a).

Open Buffer Zone

There are two large buffer zones of Area A. One is located on the northwest portion of Area A and encompasses the 22-acre plot permitted to NCI-Frederick and most of the land north along Rosemont Avenue. A comparable size open buffer zone is present on the south central portion of Area A south of the Commissary and UEPH areas. A small open buffer zone occurs south of the family housing area.

There are two open buffer zones in Area B. The majority of the landfill is encircled by open buffer. The other open buffer zone includes the extreme eastern portion of Area B south of the Flair Armory.

Operations

The 1108th, 1110th, and 1111th U.S. Army Signal Battalions are situated in the eastern corner of Area A away from more developed areas of the Installation. This location was chosen based on engineering criteria and to allow for future expansion of communications. The U.S. Army Signal Battalion has specific space requirements which are linked to the location of various antennas and electronic equipment shelters at the facility. For example, the facility contains large antennas that require an unobstructed link to orbital communications satellites.

Research, Development, Test, and Evaluation (RDT&E)

Several tenants at Fort Detrick perform research and development activities. The majority of the research and development is performed by USAMRIID, USDA, USACEHR, and NCI-Frederick. These research and development facilities require specialized environmental controls and utility support due to the nature of the activities.

The majority of USAMRIID's research and development activities are conducted in Buildings 1412 and 1425. These buildings are easily accessible and close to the security office. The USDA complex is located on the northeastern part of Area A in close proximity to its agriculture research fields. USDA also occupies other buildings (i.e., Buildings 326 and 374) on the western side of the Installation.

USACEHR occupies several buildings at Fort Detrick: Buildings 568, 1055, 1056, and 1058. Administrative duties are conducted in Building 568, which is centrally located. The other USACEHR buildings are located in two other areas. Building S-459 is located on Miller Drive in the NCI-Frederick Campus and the remaining buildings are located on Patchel Street near Stark Street.

Recreation

There are a variety of recreational facilities throughout Fort Detrick. An asphalt running track is located near the Main Gate at the intersection of Ditto Avenue and Porter Street. Recreational facilities including a free-weight room, a swimming pool, a tennis court, a basketball court (i.e., the HOT Dome), and a bowling alley are located in a second recreational area between Chandler and Sultan Streets. Additional ball fields are located in the family housing area. Other recreational areas include the Nallin Farm Pond, the Physical Fitness Center, the golf driving range, and the wooded area north and west of the officer family housing area. Further, there are approximately six miles of jogging trails throughout the Installation.

Training

USAG developed *Land Use for Military Training*, Fort Detrick Regulation (FD REG) 350-1, to govern outside troop training activities at Fort Detrick (USAG, 2000c). FD REG 350-1 identifies one area in Area A and three areas in Area B for troop training activities. In general, the areas that have been designated for training are also used for other purposes (e.g., recreation). The primary training areas are: 1) Land Navigation Course on Area A, 2) the Lime Kiln area on Area B, and 3) the area near the Flair Army Reserve Center on Area B. The Land Navigation Course, located near Forest Block 1 of Area A, is available year round for on-road vehicle training.

According to FD REG 350-1, Common Task Training (CTT) and Reserve training exercises will be permitted in the Lime Kiln Area. However, the Lime Kiln is considered off-limits to troops. The Lime Kiln area is located near the entrance to the landfill on the northern side of Area B. This area was evaluated in a previous Phase I Archeological Survey and was determined to not be a significant cultural resource (see Section 4.9.3).

The Flair Army Reserve Center is located in the northeastern corner of Area B. This area will be utilized as a staging area for Reserve Training Exercises in coordination with the Flair Army Reserve. Troops are permitted to use blank ammunition in accordance with the Training Regulation during training exercises and are responsible for collecting all residue (USAG, 2000c). According to FD REG 350-1, the use of live ammunition, smoke grenades, smoke pots, tear gas, or pyrotechnics is not authorized on Fort Detrick. Upon completion of training exercises, troops must ensure that the land is returned to its natural state (USAG, 2000c).

Utility

A significant feature of Area A of Fort Detrick is the AP transmission line which transects all of Area A. Several substations are scattered throughout the Installation. Fort Detrick has provided AP with a right-of-way for a substation currently under construction immediately adjacent to the USDA (Building 1301).

4.2 CLIMATE

The temperate continental climate of Frederick County has four distinct seasons with generally short, warm (occasionally humid) summers and winters that are mild with occasional cold periods. Local weather patterns are influenced by the Catoctin Mountains, which is a north-south trending mountain range located approximately 5 miles west of Fort Detrick (USAG, 1998a). The annual average temperature is 54 degrees Fahrenheit ($^{\circ}$F), however, historical extreme temperatures have ranged from -12 $^{\circ}$F in winter to 109 $^{\circ}$F in summer. The average annual precipitation for Frederick is 40.8 inches. The average annual snowfall is 26.4 inches for Frederick County (Maryland State Office of Climatology, 2002). Between 1950 and February, 28, 2003, the following weather related events occurred in Frederick County: 22 tornados, 34 floods, 24 hail events, 15 heavy rain events, 47 snow and ice events, 18 lightning events, 127 thunderstorms and high wind events, and 10 droughts (National Climatic Data Center [NCDC], 2003).

The prevailing wind direction for the area is west-southwesterly with an annual average velocity of 7.4 miles per hour. Prevailing winds in the region influence seasonal climatic variations in the Fort Detrick area. In the winter months (October - April), prevailing winds are from the northwest and bring clear, cool weather. During the summer (May - September), a large high-pressure

system in the Atlantic Ocean, known as the Bermuda High, frequently influences the region. This system brings warm, moist air into the region from a southwesterly direction (MDE, 2000a).

The MDE has categorized Frederick County within the Central Region of Maryland for climatic recording purposes. Throughout the summer of 2002, the Central Region had been in "emergency drought status", which indicated that rainfall, stream flow, and groundwater levels were well below normal. Precipitation from September, 2001 through December, 2002 resulted in a deficit of –3.3 inches below normal for the Frederick Area (MDE, 2002a; MDE, 2002b). Frederick received about 35-40 percent below normal rainfall for the one-year period (September 2001-August 2002). The groundwater levels for four wells monitored in the Central Region were at record-breaking lows during the winter of 2001-2002. Precipitation received by Frederick County from January 2003 to June 2003, measured at 74.83 inches, was over 30 inches above the normal precipitation calculated from a 30-year period (Maryland State Office of Climatology, 2003). As of February 20, 2003, the region has been lifted out of emergency drought status (MDE, 2003a). Precipitation from September 1, 2001 to May 31, 2003 showed an excess of 3.1 inches above normal for the Frederick Area (MDE, 2003b).

4.3 GEOLOGY

4.3.1 Piedmont Plateau Physiographic Province

Fort Detrick lies in the western part of the Piedmont Plateau Physiographic Province (Appalachian Highlands) in a geologic subdivision known as Frederick Valley (see Figure 4-3 and Figure 4-4). The Piedmont Plateau extends from its Fall Line boundary with the Coastal Plain Physiographic Province in the east to the Catoctin Mountains of the Blue Ridge Physiographic Province in the west. The Piedmont Plateau is characterized by rolling terrain and rather deeply incised stream valleys and comprises approximately 29 percent of Maryland's land area.

Frederick Valley trends north to south, extends 26 miles, and is six miles wide. Directly west of Frederick Valley are the Catoctin Mountains. The Frederick Valley is known as the Frederick Syncline and the Catoctin Mountains are part of an overturned anticline known as the South Mountain Anticlinorium (USACOE, 2000a).The elevation of Frederick County ranges from 294 ft. to more than 2,000 ft. above sea level, whereas elevations at Fort Detrick range from 320 ft. to over 400 ft. above sea level (USAG, 1997a).

4.3.2 Regional Geology

Rocks of the Frederick Valley consist of Cambrian limestone and Triassic shale and conglomerates (USACOE, 1993b). The regional geology underlying Area A is fractured limestone and dolomite of the Upper Cambrian Frederick Formation. The Frederick Formation consists of the Rocky Springs Station Member, Lime Kiln Member, and the Adamstown Member (USACOE, 2000a). The contact between the Rocky Spring Station Member and the Adamstown Member bisects Area A, with the eastern portion underlain by the Adamstown Member and the western portion of Area A underlain by the Rocky Springs Station Member. The Adamstown Member, a uniformly fine-grained, laminated and thin-bedded, dark gray limestone, with sparse burrows and fauna. This unit contains several traceable breccia stones (USAG, 1998a).

A geologic investigation was conducted in March of 2003 within the parameters of the proposed BioMedical Research Campus on Area A. Geologic conditions show two boring sites (B-6 and B-11) with soft soils that would require additional investigation to determine the presence of sinkholes. Bedrock was encountered at a depth of 7.0 ft. (B-9) in the stormwater management area, possibly limiting design of the Campus due to the State of Maryland recommendation that the bottom be at least 4.0 ft. above the water table or bedrock. Excavation or large areas of limestone rock is expected to require blasting, whereas conventional large earth moving equipment will be feasible for excavating other substrates. Recommended additional analyses to define bedrock surface and presence of sinkholes include test borings, test pits, seismic refraction or other investigations at the proposed building sites (Schnabel Engineering North, 2003).

Tertiary shales, mudstones, and limestone conglomerates are found in the central and northeast portions of Area B. A large fault which runs from the northwest to southeast separates these rocks from the Cambrian limestones. The southeastern portion of Area B is underlain by the Rocky Springs Member. Alluvial and colluvial deposits of the Mountain Wash unit occupy the southwest quarter of Area B. The northwest half of Area B is underlain by the Newark Group which is composed of interbedded gray sandstone, red shale, and siltstone (DA, 1991). Rock strata dip in Area B is to the east-southeast and is usually steep, ranging from 30º to 50º (USAG, 1997a).

4.3.3 Sinkholes and Depressions

Sinkholes commonly occur in the Frederick Formation. Sinkholes are round depressions in the landscape created by groundwater dissolution of limestone, which causes the collapse of an underlying cavity. The potential for the formation of sinkholes increases in response to unnatural surface loading (e.g., building construction, stormwater retention) in enclosed topographic depressions (USAG, 1998a).

The USACOE prepared a map of sinkhole/depression and fracture trace/lineament features occurring on Areas A and B of Fort Detrick using the U.S. Geological Survey USGS 7.5 minute Frederick, Maryland topographic quadrangle map dated 1988 and aerial photographs of Areas A and B in the Fort Detrick area dated 1937 (i.e., before significant development) (see Appendix G).

Sinkholes/depression features were identified based on topographic characteristics, vegetation, and soil tone indicators of subcircular depressions. On aerial photographs these features may have light signatures indicating dry conditions in the sinkholes or dark signatures indicating shallow, clay filled sinkholes containing moisture. Natural linear features observed using aerial photographs were identified using topographic characteristics (including straight stream segments), vegetation, or soil tonal alignments, which are continuous for less than one mile. Features that continued for more than a mile were termed lineaments. The linear features on aerial photography are reflective of geological features such as faults, joints, zones of weakness, or bedrock contacts but also may indicate man-made structures such as fence lines, buried pipeline, or drainage ditches. The sinkhole/depression and fracture trace/lineament features were verified by ground-truthing field survey (USACOE, 2001).

4.3.4 Fracture Traces and Lineaments

Fracture traces and lineaments are linear features that may suggest the presence of natural, geologic features, such as faults and joints; or they may reflect man-made structures, such as fence lines, or drainage ditches (see Appendix G; USACOE, 2001). Subterranean fracture traces that are connected to the aquifer may represent pathways for groundwater flow and have the potential to influence the regional groundwater flow regime (USACOE, 2002d).

4.3.5 Seismic Conditions

Fort Detrick is located within a Seismic Zone 1 area with seismic coefficients ranging from 0.03 to 0.07. Seismic Zone 1 is characterized as an area that may receive minor damage due to distant earthquakes, such as earthquakes with epicenters in other states (USAG, 1998a). Maryland has a low probability of earthquakes, with a very low chance of experiencing a damaging earthquake in a 50-year period (Maryland Geological Survey [MGS], 2002).

4.4 SOILS

The soils of Frederick County consist of a combination of residual lime soils and wind-transported soils and are among the most agriculturally productive in Maryland. The subsurface material in Area A is predominantly a reddish-brown sandy clay underlain by a hard limestone which is medium to dark gray in color (Soil Conservation Service, 1956). The Duffield/Frankstown series are the predominant soil types in Area A of Fort Detrick (see Figure 4-5). These soils are characterized as deep, well-drained, moderately permeable soils which develop from impure limestone (USACOE, 2000b). Both soils are fertile, highly productive, easy to manage, and very similar in both use suitability and management needs. The Duffield series of soils are found extensively throughout the Frederick Valley (USACOE, 2000b). Available water capacity for the Duffield series of soils is low to moderate. The Frankstown silt loams are slightly shallower than the Duffield and contain more shale or cherty gravel. The potential of these soil types to support grasses, herbaceous plants, wetland plants, hardwood and coniferous trees, agriculture, and associated wildlife is good (USAG, 1998a).

The soils in Area B include the Lindside, Augusta, Athol, Penn, Colbert, and Hagerstown series (see Figure 4-6) (USACOE, 2000b). The Lindside series soils are found in floodplains and upland depressions. These soils are limited to the area of the intermittent stream, which runs through the center of Area B. Augusta series soils are found on alluvial terraces and low deposits of colluvial material in the southern portion of Area B. The Athol and Penn series soils occupy the major portion of this area. These soil types are similar and typically red in color. Penn soils develop from purple to dark red shale and sandstone and require intensive management to increase fertility. Athol soils develop from weathered limestone, red shale, and sandstone, and are characterized as highly productive. Hagerstown series soils are derived from limestone and can be highly productive. The Colbert soils have low fertility and permeability and are found in limited areas (USACOE, 2000b). There are three subsurface conditions in Area B. The southern half of Area B is composed of a red-brown, highly plastic, silty clay with numerous gravelly zones. The northwestern section contains a red-brown, gravelly clay with some mica; and the north central sector of Area B contains hard micaceous shale (USAG, 1998a).

4.5 WATER RESOURCES

4.5.1 Surface Water

Fort Detrick is located within the Monocacy River drainage basin, a sub-basin of the Middle Potomac River Basin, covering approximately 986 square miles (U.S. Environmental Protection Agency (USEPA), 2001). Approximately 75 percent of this watershed area is located within the State of Maryland, with the remainder in Pennsylvania. The land use in the Monocacy River Drainage Basin is predominately agricultural (75 percent) and supports 3,500 farms with an average farm size of 150 acres. The remaining land uses in the watershed include forests, the City of Frederick, and residential neighborhoods (Alliance for the Chesapeake Bay, 2002).

The Monocacy River ranges from 40 to 375 ft. in width and from 0.5 ft. to 18 ft. in depth. This major stream originates at the Maryland-Pennsylvania border and flows southerly to the east of Fort Detrick and the City of Frederick. The Monocacy River joins the Potomac River 15 miles south of the City of Frederick and eventually discharges into the Chesapeake Bay (USAG, 1998a). Stream discharge rates of the Monocacy River near Fort Detrick are obtained from measurements collected at the Jug Bridge gauging station located approximately 5 miles southeast of Area A (USGS, 2000). This station drains approximately 817 square miles of the watershed above the City of Frederick (USGS, 2002a). Based on 74 years of record (1929 through 2003), daily mean flow recorded at this station has ranged from a minimum of 19 cubic feet per second (cfs), 12 million gallons per day (mgd), to a maximum of 73,873 cfs, 47,742. The average annual stream flow was 938 cfs, 606 mgd (USGS, 2003). During this period of record, the maximum instantaneous discharge of 81,300 cfs, (52,645 mgd, occurred on June 23, 1972, and the minimum instantaneous discharge of 17 cfs, 11 mgd, took place on September 11 and 13, 1966 (USGS, 2002a). The flood threshold at the Jug Bridge gauging station corresponds to a discharge of approximately 15,500 cfs, 10,000 mgd; therefore, flood events are not uncommon (USGS, 2000; National Weather Service, 2002).

The Monocacy River is a water supply source both for Fort Detrick and the City of Frederick. The City draws approximately 28 percent of its drinking water (an average of 1.93 mgd) from the Monocacy River (Seal, 2002a). The three WTPs operated by the City of Frederick treated approximately 2.52 billion gallons of water in 2001 (Seal, 2002b). Fort Detrick relies on the Monocacy River as its sole source for drinking water and currently withdraws water at an average rate of about 1.5 mgd (Grams, 2003a).

In addition to public water supply, the Monocacy River is also used for agricultural irrigation, boating, canoeing, and recreational fishing. It is a warmwater fishery and has been classified by the State of Maryland as Recreational Trout Waters and Public Water Supply (Use IV-P) (Code of Maryland Regulations [COMAR] 26.08.02). Use IV-P waters are managed as special fisheries by periodic stocking and seasonal catching and have the potential for supporting adult trout populations for put-and-take fishing. Monocacy River's tributaries that are not designated Use IV-P are designated as Use III-P (Natural Trout Waters and Public Water Supply). These tributaries must maintain water quality standards that ensure the growth and propagation of self-sustaining trout populations and their associated food organisms. Use III-P tributaries must provide a safe and effective public water supply source. Carroll Creek, the major tributary to the Monocacy River in the vicinity of Frederick, is classified for Use III-P. This creek originates in the wooded uplands of the Catoctin Mountains 1.8-2.0 miles west of Frederick, flows southward between Area A and Area B, and discharges into the Monocacy River (USAG, 1998a).

The water quality of aquatic resources in the Monocacy River drainage basin is classified as having low vulnerability to pollutants and other stressors and "less serious problems" (USEPA, 2002a). Actions to prevent declines in aquatic conditions in this watershed are rated lower priority by USEPA than those for watersheds that have a higher vulnerability to pollutants and other stressors. The principal pollutants and stressors for the Monocacy River and its tributaries are nutrients, suspended sediment, and low dissolved oxygen concentrations, which are caused by non-point sources, both natural and agricultural (USEPA, 2002b). A high potential for sediment loading in this river exists, especially due to surface runoff from urbanization and agriculture (USAG, 1998a).

Frederick County, as well as the state of Maryland, recently experienced the worst drought conditions since the 1930s (Greenfield, 2002). The highest mean monthly stream flow in calendar year (CY) 2000, the last year before the recent drought, was 2,033 cfs, 1,314 mgd, in March, and the lowest mean monthly stream flow was 275 cfs, 177 mgd, in October (USGS, 2002c). By contrast, the CY 2002 stream flow ranged from the highest mean monthly stream flow of 1,752 cfs, 1,132 mgd, in December to the lowest mean monthly stream flow of 62 cfs, 40 mgd, in August (USGS, 2003). Level One Mandatory Water Use Restrictions were implemented after emergency drought was declared by former Governor Parris N. Glendening (MDE, 2003a). Restrictions included prohibitions on the use of water for residential landscaping, washing of paved surfaces, non-recycling water ornamental fountains, washing of vehicles, as well as unsolicited service of tap water in food service establishments. As of February 20, 2003, the drought emergency in the central region of Maryland was lifted, including Frederick County, removing Level One Mandatory Water Use Restrictions (MDE, 2003a). While drought-related water restrictions on the Installation were lifted on March 6, 2003, Colonel John E. Ball, Deputy Installation Commander, urged the Installation to voluntarily reduce water consumption.

Surface water sources within Area A include the 3.3-acre Nallin Farm Pond, two unnamed tributaries of the Monocacy River, and the pond adjacent to the substation north of Porter Street. The Nallin Farm Pond was formed by the diking of natural springs (USAG, 1998a). A permit issued by the MDE to use the Nallin Farm Pond for emergency consumptive uses (Water Appropriation and Use Permit #FR43S101(01)) was inactivated on April 24, 2000. However, Fort Detrick can use the Nallin Farm Pond for emergency firefighting purposes, which does not require a permit (Sheffer, 2002a). One unnamed tributary, located 0.4 mile south of the Nallin Farm Pond, originates in the south central portion of Area A, flows east to the southeastern boundary of Area A through a swale adjacent to the UEPH housing stormwater retention pond and outflow A-4, exits Area A, and discharges one mile east into the Monocacy River. The other unnamed tributary extends south from the Nallin Farm Pond, then flows east, exits the eastern portion of Area A, and discharges one mile east into the Monocacy River (DA, DIS, 2001; USAG, et. al., 2000). This stream formerly originated on the Frederick Community College (FCC) property, entered the north central boundary of Area A flowing southeastward, then turned toward the south and discharged into the Nallin Farm Pond. During a site visit conducted in April 2002, the upper stretch of the tributary was not seen. Agricultural activities involving the plowing and cutting of grass for hay bales may have contributed to the absence of this tributary (Sheffer, 2002a). The pond adjacent to the substation north of Porter Street was originally planned as a stormwater management pond, however, its depth allowed groundwater to infiltrate creating a permanent pond. This pond was observed to contain water during the emergency drought conditions of 2003 and was therefore determined to be groundwater fed

(Silvestri, 2002c). The banks of the pond are littered with muskrat holes and the pond is filled with sediment. It drains into a culvert, crosses Porter Street, flows into an unnamed tributary and eventually leaves Installation property through the swale next to the A-4 outflow.

Surface water sources at Area B include Post Pond, Carroll Creek, one discontinuous tributary, three unnamed tributaries of the Carroll Creek, and several discontinuous ditches (DA, DIS, 2001; USAG, et. al., 2000). Post Pond has a surface area of approximately 0.23 acres and is located in the southwestern corner of Area B (USAG, 2001a). One discontinuous tributary originates in the Catoctin Mountains, flows 1,000 ft. east through Area B, and then terminates at that point, which appears to make it a recharge area for groundwater. The southernmost unnamed tributary of Carroll Creek originates in the Catoctin Mountains, runs across the southern portion of Area B, and heads east toward Carroll Creek. Another unnamed tributary of Carroll Creek originates near the USAMRIID LARF and flows south to converge with the third unnamed tributary of Carroll Creek, which originates in the south central portion of Area B. These two tributaries converge and flow 75 ft. south prior to converging on-site with the southernmost unnamed tributary of Carroll Creek. The tributary then flows off of Area B and approximately 2,000 ft. east into Carroll Creek (DA, DIS, 2001; USAG, et. al., 2000), which ultimately discharges into the Monocacy River.

4.5.2 Groundwater

As a part of the broader Piedmont Hard Rock Formation, the Frederick area contains some of the most productive hard rock aquifers in the state, with relatively good groundwater quality. Approximately 20% of these formations have the potential to yield 50 gallons per minute (gpm) or more of water. Most of the wells in the area draw water from fractures or solution channels located within calcareous rock (e.g., limestone, marble). These fractures are extensively interconnected and have a high potential for groundwater contamination (USACOE, 2000b). The groundwater gradient slope in the immediate vicinity of the Installation flows to the southeast, toward the springs and the Monocacy River (USACOE, 2000b). Groundwater data from 1965 suggest that the depth of the water table in Area A ranges from 6 ft. to 27 ft.

Trichloroethylene (TCE) was detected in the production well in Area A in 1987 at levels above the USEPA Maximum Contaminant Level (MCL) of 5 parts per billion (ppb) for drinking water (40 CFR 141.32) (USACOE, 2000b). Fort Detrick withdraws an average of 8,000 gallons a day of groundwater in accordance with MDE Permit No. FR43G-101(03) from one well in the Frederick Limestone near Building 568 in Area A. Water withdrawn under this permit is utilized by USACEHR laboratories for research purposes (USAG, 2002e). TCE was once used as a coolant in the USACEHR laboratory. Although TCE is no longer used, it is likely that a deep zone of contaminated soil continues to leach TCE into the groundwater supply (USACOE, 2000b). Water from this well is treated to remove the TCE prior to use by the USACEHR. The contaminated ground water cannot be used for human consumption.

The depth of the water table in Area B fluctuates over a great extent throughout the year, ranging from 4.5 feet in March to 47 ft. in October. The water table typically fluctuates up to 25 ft. during the spring. The fault, which transects Area B, hinders but does not totally restrict groundwater flow across that plane. Previous groundwater investigations on Area B indicated that volatile organic compounds (VOCs), such as TCE, have been detected in the groundwater underlying Area B (USAG, 1998a).

Since Fort Detrick does not use groundwater for its drinking water supplies, the presence of TCE and other VOCs does not pose a health risk to residents and workers on the Installation. For a more detailed description of the contamination present at Fort Detrick and the remedial steps being taken by the DA (see Section 4.23).

4.5.3 Drinking Water

4.5.3.1 Source Water

Fort Detrick owns and maintains the Installation water distribution system. Source water is withdrawn from the Monocacy River and is processed through the Fort Detrick WTP located in Area C approximately 1.5 miles to the east of Area A. The WTP has a maximum processing capacity of 4.25 mgd (USAG, 2000a). The Water Management Administration, MDE has authorized Fort Detrick to withdraw a daily average of 2.0 mgd with a maximum daily withdrawal of 2.5 mgd from the Monocacy River under Water Appropriation and Use Permit No. FR43S001(02). This water allocation permit expires in 2012 (Mayles, 2003a; Silvestri, 2002a). Water obtained in accordance with this permit is utilized as potable water, cooling water, and for sanitary facilities at Fort Detrick. Fort Detrick, on the average, produces finished water at the rate of 1.3 - 1.5 mgd at the WTP, producing approximately 466 million gallons of water in FY 2001 (Spears, 2002a). The WTP utilizes conventional treatment processes, and is operated and staffed 24 hours a day (Grams, 2003a). The Installation provides drinking water that meets or exceeds all Federal, state (COMAR 26.04.01), and DA criteria (Grams, 2003b). Fort Detrick also holds a Water Use and Appropriation Permits for Building 568, which expires on September 1, 2004.

4.5.3.2 Water Treatment

Source water is filtered and processed by prechlorination, chemical addition with flash mixing, filtration, sedimentation, and flocculation. Chemicals added during treatment include chlorine for disinfection, activated carbon for taste and odor control, lime for pH control, and aluminum sulfate and sodium aluminate for flocculation. Water is currently chlorinated to 1.5 - 1.8 parts per million (ppm) free residual prior to distribution (Grams, 2003b) (see Table 4-1). Polymer is added to the pretreated water to enhance flocculation in the winter months (Grams, 2003a). Sludge generated by the water treatment process is disposed of in the Fort Detrick landfill (Grams, 2003b).

Fort Detrick has a fluoridation system although fluoride is not currently added to the Fort Detrick drinking water supply. After a study and EA were completed it was determined that fluoride would be beneficial as a preventive tooth decay measure if added to the drinking water on Fort Detrick. The concentration of fluoride in the finished water will be 0.9 ppm (USAG, 2002b). The background level of fluoride in the Monocacy River is approximately 0.2 ppm (Grams, 2003b). Fort Detrick may award a project to repair the fluoridation system in 2003 and begin fluoridation of the drinking water supply immediately after repairs have been completed (Sheffer, 2003).

Table 4-1. Monthly Average of Chemical Additives (In Pounds) for the WTP.

Chemical	2000	2001	2002
Aluminum sulfate	14,045	13,930	16,049
Sodium aluminate	2,838	2,111	2,700
Activated carbon	2,461	1,508	1,596
Lime	3,846	3,163	4,325
Chlorine	2,302	1,578	1,762
Polymer	62[1]	72[2]	65[1]

[1] Polymer average includes months when administered: January, February, March, April, November, and December.

[2] Polymer average includes months when administered: January, February, March, April, October, November, and December.
Source: Grams, 2003a

Treated water exits from the system through four pipes which merge into two 12-inch pipes. Subsequently, the water flows into one 16-inch pipe to the lime building where the water is chlorinated and lime is added to adjust pH. The pH of treated water is maintained at about 7.7. Finished water flows into the two clear wells with a 500,000 gallon capacity. The clear wells allow for sufficient contact time for disinfection during chlorination. Disinfected water is pumped into the water distribution system (Grams, 2003b) (see Figure 4-7). Fort Detrick has in place a Cross Connection Control Plan (Fort Detrick Environmental Office, 2003). Cross connection control and backflow prevention are practiced at Fort Detrick. There are no known incidences of contamination of the Fort Detrick potable water supply (USAG, 2000a). Certified technicians ensure that backflow prevention devices are installed and functioning properly at all appropriate locations throughout the water distribution system (Mathews, 1998). The quality of the drinking water at Fort Detrick meets or exceeds all Federal, state, and DA criteria (COMAR 26.04.01) (Fort Detrick Environmental Office, 2003). Finished water is used for human consumption, process water, irrigation, and fire protection. The 2002 average monthly water production at Fort Detrick is approximately 38.25 million gallons which is roughly equivalent to 1.2 mgd (see Table 4-2) (Grams, 2003b).

Table 4-2. Fort Detrick Total Water Production and Wastewater Generation.

FY	Water Produced (gallons)	Sewage Generated[1] (gallons)
2000	453,883,000	339,072,000
2001	460,402,000	317,912,000
2002	462,717,000	267,912,000

[1] Data includes sanitary and contaminated wastewater.

Source: Grams, 2003b.

4.5.3.3 Water Distribution System

Fort Detrick and the City of Frederick have a verbal agreement to exchange potable water. Under this agreement, Fort Detrick and Frederick occasionally exchange water between their water distribution systems through a manual connection on Area A in cases of emergency or if

the plant was shut down for repair (Grams, 2003b). Metering of the shared water is not performed. There is no written agreement between Fort Detrick and the City of Frederick (Grams, 2003b). The City of Frederick pumps 28.3% of its drinking water from the Monocacy River (City of Frederick, 2003). This water intake is approximately 75 yards upstream from the Fort Detrick intake. The City of Frederick fluoridates the drinking water supply to 0.8-1.0 ppm using 23-25% hydrofluosilicic acid (Luhn, 2003).

Limitations of the water supply system to support increased demands from Fort Detrick are: 1) the processing capacity of the WTP; 2) line pressure and pipe size; 3) the volume of water available from the Monocacy River; and 4) the availability of source water during drought conditions. The capacity of the WTP is 4.25 mgd, however, only 0.8 - 2.5 mgd are normally consumed (Grams, 2003b). Although there is ample capacity at the WTP, the size of the pipes in the distribution system, and the lack of pressure are potential weaknesses of the system (USAG, 1998b; Grams, 2003c). The WTP can provide 3.1 mgd of finished water without increasing water pressure in the distribution lines (Potter, 2003). The majority of the water distribution system is more than 40 years old and will likely require increased maintenance and repair to maintain integrity. The ability of the WTP to supply Fort Detrick with sufficient quantities of quality drinking water is also dependent upon the rate of flow and quality of the water received from the Monocacy River. The Water Appropriation and Use Permit limitation of 2.0 mgd withdrawal from the Monocacy River is also a limiting factor. Water losses incurred from fire hydrant flow tests, WTP leaf screen flushing, building sprinkler system flushing and testing, and water main flushing and repairs amount to 904,000 gallons per month or 10,848,000 gallons per year (USAG, 2000b). Currently BMPs are being implemented to minimize water usage during testing and flushing (USAG, 2000b).

4.5.3.4 Drinking Water Standards

The Safe Drinking Water Act (SDWA) (40 CFR 141) sets forth Federal water quality standards for drinking water and is implemented by DA through AR 200-1. The National Primary Drinking Water Standards of the SDWA establishes MCLs for various contaminants in drinking water. The Water Management Administration of the MDE monitors and enforces compliance with Federal standards. The quality of water is monitored by Fort Detrick personnel and by MDE. Operators conduct daily testing at the WTP water quality laboratory. The WTP operators are properly certified in accordance with 40 CFR 141.70E, COMAR 26.05.A.(1) and AR 200-1. The 2001 Environmental Compliance Assessment System investigation concluded that the Fort Detrick WTP is competent with the only deficiency in documentation of laboratory quality assurance/quality control. The WTP was also found to be in compliance with the following USEPA rules: the Surface Water Treatment Rule, the Total Coliform Rule, and the Lead and Copper Rule (Grams, 2003b).

4.5.4 Wastewater

4.5.4.1 Wastewater Collection System

Generally, 60% to 80% of the water consumed at Fort Detrick becomes wastewater. It is estimated that 90% of the total wastewater generated at Fort Detrick originates as sanitary sewage. The remainder is industrial wastewater and is treated as potentially infectious (USAMRMC, 2001). Currently, Fort Detrick maintains two sewer systems: the sanitary sewer system and the LSS. The majority of wastewater generated on the Installation travels by gravity

flow through the sanitary sewer system to the pumping station in the southern corner of Area A, where it is pumped to the WWTP. Sludge generated by the water treatment process is thickened, dried, packed, and sent to a hazardous waste disposal site in Utah (Grams, 2003b). Wastewater originating from some of the laboratories on the Installation (i.e., USAMRIID and USDA) is considered to be potentially infectious and is therefore collected separately via the LSS and treated at the SSP. All wastewater processed at the SSP is transported to the WWTP in Area C for final treatment and then discharged into the Monocacy River downstream from both the City and Fort Detrick WTP water intakes.

The WWTP operates at 40 to 50 percent of its capacity of 2.0 mgd (Grams, 2003a). The Fort Detrick WWTP processes between 750,000 gallons to one million gallons of sewage daily on average (Grams, 2003b). The wastewater is treated and then discharged into the Monocacy River subject to MDE permit MD0020877, which expires on August 31, 2003 (Mayles, 2003a).

Approximately 30% of the water produced at the WTP does not enter the WWTP, with losses reaching a high of 42% in 2002 (see Table 4-2). Inputs to the water and wastewater systems include water obtained from the Monocacy River through the WTP, injections of steam at the SSP, and leachate from the Area B landfill (Gortva, 2003a). Potential sources of water loss include evaporation from the cooling towers and laboratory process use, water pressure and flow testing, waterline flushing and fire hydrant testing, leaf screen washing at the WTP, lawn watering activities, irrigation, water line leaks, leaf screen flushing, water line flushing, and fire protection. However, estimated losses through these processes do not fully account for the 30% average monthly loss of water from the system. Investigations into the discrepancy between the water supply and the wastewater components of the system are needed to determine where water is being lost in the system.

4.5.4.2 LSS-SSP System

The LSS, which was constructed in stages between 1949 and 1972, was used for conveyance of biological wastes produced by former Army biological warfare (BW) laboratories at the Installation until the cessation of offensive BW research in1969. Potentially infectious wastewater was decontaminated or sterilized in the laboratories before discharge into the LSS, which conveyed the waste to the SSP for sterilization. Effluent from the SSP was discharged to sanitary sewers for further treatment at the Fort Detrick WWTP and eventual discharge to the Monocacy River (USAMRMC, 2002).

The LSS consists of underground piping ranging from a 2-inch diameter to a 12-inch diameter. Pipe is primarily cast iron with leaded bell and spigot joints with the exception of building connections accomplished after 1992. These building connections are constructed using ductile iron pipe with mechanical (stuffing box) type joints. Property records indicate the construction of some wrought iron lines, 1,500 ft. of steel lines in 1953, and some concrete lines in 1956.

All steel lines are thought to have been removed from service and abandoned in years past, and no active concrete lines are known to exist. The LSS lines to the SSP are all gravity flow. Practice has been that LSS lines are encased in a minimum of 6 inches of un-reinforced concrete on all sides of the pipe. However, lines were found unencased in the Building 522, 427 and Building 325 areas in 1994. In addition reinforced concrete has been specified in some unstable locations. Concrete encasement serves as physical protection and an identification means for the lines (USAG, 1997a). The LSS is generally 10 ft. or less below the ground

surface, generally above the water table, and overlying a formation of Karst bedrock (RASCO Inc., 1996).

It was determined that NCI-Frederick did not require the additional treatment provided at the SSP since they decontaminate their wastewater on-site via autoclaves or chemical treatments in accordance with Centers for Disease Control and Prevention (CDC)/National Institutes of Health (NIH) Guidelines. To reduce the excessive costs of the redundant treatment NCI-Frederick disconnected their buildings from the LSS in 1996/1997. These former biological warfare laboratories on the NCI-Frederick Main Campus were decommissioned and disinfected between 1969 and 1973. The laboratory waste plumbing was disinfected, and the spent disinfectant was drained into the LSS through the building connections (USAG, 1997a). NCI-Frederick now discharges laboratory wastewater, which has undergone sterilization or chemical decontamination at the source, directly to the Installation sanitary sewer system.

Currently, buildings with LSS and sanitary sewer service are: Buildings 374, 1412, and 1425 (USAG, 1997a). Wastewater generated by USAMRIID and the USDA Building 374 greenhouse complex is treated via the LSS-SSP system. The activities conducted in BSL-4 laboratories at USAMRIID generated 24,802,000 gallons of potentially infectious wastewater that must be sterilized twice prior to discharge into the sanitary sewer system (USAMRMC, 2001). All BSL-4 wastewater from USAMRIID is decontaminated before leaving the laboratory in accordance with 32 CFR 627.46, DA Pamphlet 385-69, and the CDC/NIH guidelines. Per regulation, USAMRIID effluents from BSL-4 laboratories are also sterilized at the SSP. Wastewater from the proposed USAMRIID animal facility (AF) will also require steam sterilization and will be connected to the LSS-SSP upon completion (USAMRMC, 2002).

The use of imported species at USDA requires additional treatment of wastewater by the SSP (or an alternative treatment facility) prior to discharge into the sanitary sewer system. The SSP provides primary wastewater treatment for this facility. Of the total wastewater generated by the Installation, only the wastewater generated by activities at USAMRIID and the USDA greenhouse complex requires the additional treatment provided by the SSP prior to discharge to the WWTP (USAG, 1997b).

Fort Detrick will be replacing the LSS-SSP system. However, construction of new local sterilization facilities to support USAMRIID and USDA has been delayed by pending authorization of the required additional funding and encountering unexpected rock during excavation activities. Interim measures, upgrading portions of the existing LSS, have been initiated to replace segments previously identified as having the highest potential for leakage (USAG, 2002d). The new LSS being installed is a double-wall pipe with built-in leak detection. The SSP remains in use. In addition, some portions of the LSS will continue in service until a new system is constructed. Upon completion of planned upgrading of the systems for treatment of biological wastes on the Installation, the LSS will be abandoned after decontamination and the SSP will be deactivated.

4.5.4.3 WWTP

The Fort Detrick WWTP is located in Area C and provides secondary treatment through the use of trickling filters. An average of 0.75-1.0 mgd of wastewater is provided secondary treatment per day but the maximum capacity is 2.0 mgd. At the WWTP sewage enters primary settling basins before transport to two parallel, single-stage crushed rock trickling filters for secondary

treatment (see Figure 4-8). The effluent exits to secondary settling basins. Chlorine is added during the treatment process, but all wastewater is dechlorinated with sulfur dioxide prior to discharge into the Monocacy River. The maximum discharge in the period January 2001 to December 2002 was 1.68mgd. WWTP operators utilize the on-site water quality laboratory to perform required bacteriological, chemical and physical testing of effluent (Grams, 2000). Sludge generated from the treatment process is anaerobically digested, dried on sandbeds, packaged and shipped off-site to a hazardous waste facility.

The WWTP operates under National Pollutant Discharge Elimination System (NPDES) Permit No. MD0020877, which allows the discharge of a maximum of 2.0 mgd of wastewater into the Monocacy River. This permit was effective through August 31, 2003 (Mayles, 2003a). The existing permit is effective until the renewal is issued. Special limitations for the effluent from Fort Detrick's WWTP are provided in Table 4-3. In addition to volume limitations, effluent characteristics are limited on a concentration and total loading basis (specifically biological oxygen demand – 5 days [BOD5], suspended solids, total phosphorus, and total Kjeldahl nitrogen). The NPDES permit also provides for a maximum in fecal coliform bacteria, a minimum concentration of dissolved oxygen, and a restricted range of Ph values (COMAR 26.08.03 and 26.08.04). COMAR 26.08.02 requires that discharges to Use IV-P waters not elevate stream temperatures outside the mixing zone above either 75 °F or the ambient temperature of the surface waters, whichever is greater.

Designation of the Monocacy River as Use IV-P determines the amount of pollution this water body can receive. Fort Detrick may be obligated to increase removal efficiencies such that the total pollutant loading to the Monocacy River remains relatively constant. The current NPDES permit incorporated requirements for phosphorus removal (MDE, 2003a).

FD REG 200-7, *Non-Domestic Wastewater Control*, has set limits to local discharges for all industrial users on the Installation to 4.9 milligrams per liter (mg/L) of total phosphorus (USAG, 2001e). Discharges from industrial users are diluted by the discharges from non-industrial users (which have relatively little or no phosphorus in their discharge) on the Installation to result in an overall total phosphorus concentration in the Installation discharge that is less than the limit set by MDE (Silvestri, 2003c). The maximum daily discharge for total phosphorus is 1.89 mg/L for CY 2002 and 4.31 mg/L of total Kjeldahl nitrogen (TKN). The average daily discharge for CY 2002 was 1.23 mg/L of total phosphorus and 1.28 mg/L of total Kjeldahl nitrogen. MDE does not anticipate any changes to the nitrogen and phosphorus effluent limits for the Waste Water Treatment Plant permit renewal, however MDE reserves the right to make any changes to the permit.

The WWTP has sufficient capacity to efficiently treat wastewater generated by current activities at Fort Detrick. Permit conditions allow a discharge of up to 2.0 mgd. Maximum daily flow in the last 3 years was recorded at 1.683 mgd in July 2000 (Silvestri, 2003a). A study of the toxicity of the wastewater treatment plant effluent from October 1998 to June 1999 revealed the effluent did not affect the survival of the test specimens, cladocerans (*Ceriodaphnia dubia)* and fathead minnows (*Pimephales promelas*) (DIS, 1999).

4.5.5 Enhanced Nutrient Removal Policy

The Fort Detrick WWTP discharges treated sewage into the Monocacy River, a tributary of the Potomac River, which eventually empties into the Chesapeake Bay. Deterioration of the water quality in the bay has generated a growing environmental concern over the last 30 years.

Governor Parris N. Glendening issued the Executive Order *Nutrient Pollution Reduction Goals for Chesapeake Bay* instructing the MDE to develop and implement an Enhanced Nutrient Removal (ENR) policy for WWTPs to meet the 2010 goal set in the new Chesapeake Bay Agreement. The Governors of Maryland, Pennsylvania, and Virginia, the Mayor of Washington DC, and the U.S. Environmental Protection Agency Administrator signed the new Chesapeake Bay Agreement in 2000 replacing the first agreement signed in 1987. The Agreement set nutrient loading goals of 3 mg/L for nitrogen and 0.3 mg/L for phosphorus at WWTPs having flows exceeding 0.5 mgd. The Fort Detrick WWTP currently produces 0.75-1.0 mgd, well above the classification limit of this agreement. The 66 major WWTPs of Maryland produce approximately 30% of the nutrient loading of the Chesapeake Bay. The current administration of Governor Ehrlich is exploring other feasible options to meet those levels (i.e., nutrient credit trading within a watershed basin), postponing the completion of the draft ENR Policy to the end of 2003.

Table 4-3. Effluent Limitations from the Fort Detrick's WWTP NPDES Permit.

Effluent Characteristics	Monthly Loading Rate (kilograms/day)	Weekly Loading Rate (kilograms/day)	Monthly Average (mg/L)	Weekly Average (mg/L)
BOD_5	76	110	10	15
Suspended solids	76	110	10	15
Total Phosphorus	15	23	2.0	3.0
Total Kjeldahl Nitrogen (April 1 to Sept. 30)	23	34	3.0	4.5
Effluent Characteristics	**Maximum**		**Minimum**	
Fecal Coliforms	200 most probable number (MPN) per 100 ml monthly log mean value		N/A	
Total residual chlorine	below detection level through dechlorination		N/A	
Dissolved oxygen	N/A		5.0 milligrams/L at any time	
PH	8.5		6.5	
Flow	2.0 mgd		N/A	

Source: MDE, 2003a

4.5.6 Stormwater

Fort Detrick is permitted to discharge stormwater runoff from land used for industrial operations in accordance with NPDES Permit No. 02-SW. Stormwater drains from the Installation through a system of surface ditches, culverts, inlets, and storm sewer lines into Carroll Creek and two other tributaries of the Monocacy River. Several of these culverts are designed to accept large quantities of water and have the flow from the stormwater ponds directed to them. Stormwater from the central and western portions of Area A drains west to Carroll Creek through outfall culverts A-1, A-2 and A-7. The remaining portion of Area A exits the Installation through drains

east towards the Monocacy River via A-3, A-4, A-5, and A-6 outfall culverts and various tributaries. All of the stormwater from Area B drains into Carroll Creek via outfall culverts B-1 and B-2. Stormwater drains from Area C directly into the Monocacy River. There are currently eight sediment/stormwater management ponds on Area A and three on Area B (see Appendix H) for photographs of seven Area A ponds..

Fort Detrick's NPDES stormwater permit requires annual site compliance evaluations and maintenance of a Stormwater Pollution Prevention Plan (SWPPP) and prohibits the discharge of non-stormwater into surface waters. Fort Detrick is not required to sample its stormwater; however, sampling may be conducted, if needed, as a proactive measure. Fort Detrick maintains an SWPPP, which identifies the potential sources of pollution associated with industrial activity on the Installation which may affect the quality of stormwater discharges. The materials and pollutants of concern are identified for each site and BMPs are implemented to minimize potential contamination of stormwater exiting Fort Detrick (USAG, 2003b).

In accordance with 40 CFR 122.26 and COMAR 26.17.02, construction projects that disturb more than 5,000 sf. of land require approvals from MDE for erosion and sediment control, and for stormwater management. The DIS ensures appropriate stormwater management and sedimentation and erosion control measures are implemented.

Two stormwater management ponds are located in the southeastern portion of Area A. The southernmost stormwater management pond is a dry detention pond located behind the UEPH complex, which empties into the A-4 outflow culvert. The second stormwater pond, is located behind Building 1540 (Physical Fitness Center) and functions as a sediment trap.

Two stormwater management ponds are located in the central portion of Area A. One of these ponds exists as a wet detention pond adjacent to Building 1434 (Health Clinic). This pond is hydrologically connected to the groundwater and is filled with water year-round. The other pond is a small dry retention pond and is located between Building 1434 and Porter Street. It accepts runoff from the wet detention pond and then funnels water through an outflow culvert under Porter Street. Both of these ponds funnel water into a swale located south of Porter Street which exits the Installation via a culvert adjacent to the UEPH stormwater pond and A-4 outflow.

Three stormwater management ponds are located in the western portion of Area A. One of these stormwater management ponds is located along the perimeter fence-line, adjacent to the NCI-Frederick campus and Forest Block 3. This pond directs water through a concrete channel to the outflow next to the perimeter fence and eventually out to Carroll Creek. The pond has a 100-year storm storage volume but may have to be reconfigured to comply with quantity and quality MDE regulations. Another pond is located west of the new MCA family housing complex and is approximately one acre in size. Water from this pond exits Area A through a culvert along the northwestern perimeter fence. The third pond is located to the east of Building 393 (Incinerator) and adjacent to Boyles Street. All of these ponds exist as dry detention ponds.

The stormwater management pond adjacent to Building 1434 (Health Clinic) will be reconfigured to allow for an extension of Freedman Drive. The eastern portion of the pond will be filled and replaced with the road. However, the overall size of the pond may remain the same because the northwest portion of the pond will be extended (Silvestri, 2002b). Surface water runoff from the site of the proposed IRF will drain southeast towards this pond (USGS, 1993; USAG, et. al., 2000; DA, DIS, 2001).

Several new stormwater management ponds will be constructed with the upcoming projects (e.g., Commissary, PX, Building 1520). A regional stormwater plan and basin for Area A is currently being considered. These ponds, as well as, future stormwater management areas will comply with all MDE quantity and quality regulations.

Three stormwater management ponds exist on Area B. Two stormwater ponds act as sediment basins south of the Fort Detrick landfill and the other pond acts as a stormwater pond north of the landfill.

4.6 WETLANDS

Wetlands are jointly defined by the USEPA and the USACOE as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (USACOE, 1987). Wetlands on Fort Detrick are beneficial to stormwater management, erosion control, and sediment control. They also provide habitat for ducks, geese, herons, shore birds, muskrat, mink, and beaver and support numerous species of annual and perennial herbaceous plants (USAMRDC, 1993a). Federal activities within floodplains and wetlands are restricted under EO 11988, 33 CFR 1977 and EO 11990, and AR 415-15. Wetlands are considered to be environmentally sensitive resources (AR 200-2, Section 651.29(c)). The INRMP for Fort Detrick serves as a guide for the management and protection of wetlands at Fort Detrick to be in accordance with AR 200-3, CFR Chapter 9, and other applicable laws and regulations (USAG, 2001b).

Four wetland areas (one in Area A and three in Area B) are identified in the INRMP (USAG, 2001b) (see Figure 4-9 and Figure 4-10). This study was performed as a part of the *Storm Water Management and Erosion and Sediment Control Study*. A wetland delineation was not performed as a part of this study, rather wetland areas were only identified (Boyland, 1998). The wetlands on Fort Detrick are limited in size and number. Acreage summaries and wetland types were included in the *Wetlands Inventory Report for Fort Detrick* was completed in the summer of 1999 by the USFWS (USFWS, 1999).

Wetland area W-5 is located approximately 200 ft. south of the Nallin Farm House in Area A. This area has been used for agriculture, but the majority of the area is maintained as a lawn. Nallin Farm Pond is classified as palustrine, open-water, intermittently exposed permanent, diked/impounded. The stream carrying outflow from the pond is a low quality wetland, made up of mostly upland grasses, and is probably dry for part of the year (USFWS, 1999). It is characterized as a seasonally flooded to saturated, persistent, nontidal palustrine emergent wetland and a seasonally flooded to saturated, broad-leaved deciduous, nontidal palustrine scrub/shrub wetland. Common plants located within the wetland W-5 area include switchgrass (*Panicum virgatum*), Virginia sweet-spires (*Itea virginica*), boneset (*Eupatorium perfoliatum*), inkberry (*Ilex glabra*), arrowood (*Viburnum dentatum*), rose mallow (*Hibiscus moscheutos*), and soft-stemmed bulrush (*Scirpus validus*). Less common plants include broad-leaved cattail (*Typha latifolia*), blue flag (*Iris versicolor*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willow (*Salix sp.*), and green ash (*Fraxinus pennsylvanica*) (USFWS, 1999).

The small fenced area west of Nallin Farm Pond Drive is classified as a seasonally flooded, persistent, nontidal palustrine emergent wetland and a seasonally flooded, broad-leaved

deciduous, nontidal palustrine scrub/shrub wetland. This wetland has saturated soils which cannot support heavy mowing equipment. Common plants located within the fenced wetland include switchgrass (*Panicum virgatum*), Virginia sweet-spires (*Itea virginica*), sweet pepperbrush (*Clethra alnifolia*), inkberry (*Ilex glabra*), soft rush (*Juncus effusus*), arrowood (*Viburnum dentatum*), and sedge (*Carex sp.*).

Less common plants include water birch (*Betula nigra*), sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willow (*Salix sp.*), marsh yellow cress (*Rorippa palustris*), green ash (*Fraxinus pennsylvanica*), common reed (*Phragmites australis*), and wax myrtle (*Myrica cerifera*) (USFWS, 1999).

Area B wetland W-1 is located in the south central portion of Area B. This area is maintained as pasture land and is mowed on occasion. Despite being graded to promote drainage, the area is still a large, wet meadow classified as palustrine, emergent, with persistent vegetation and temporarily flooded water regime. Hydric soils in the area support soft rush, umbrella sedge, and other sedges (USAG, 2001b).

Area B wetland W-2 is located approximately 550 ft. south of W-1. This wetland is a stream which flows east across Area B for approximately 2,800 ft. The stream continues to flow under Shookstown Road and Montevue Lane, just northwest of the main entrance. The stream is a tributary of Carroll Creek and is classified as riverine, lower perennial, with an unconsolidated mud bottom. Black locust, black willow, silver maple, and American elm grow along the river banks (USAG, 2001b).

Area B wetland W-3 is the most diverse wetland on the Installation. It is situated in the southeast corner of Area B. This wetland is comprised of Post Pond, Carroll Creek and its associated floodplain, and a small marsh area adjacent to the edge of the flood plain. Carroll Creek flows southward along the eastern edge of Area B for approximately 1,200 ft. The creek is classified as a riverine, lower perennial, streambed, with a cobble-gravel bottom. Soils present on the banks of the creek are hydric. Located approximately 250 ft. south of Building 1243 is a wetland associated with the flood plain of Carroll Creek. The wetland is classified as palustrine, emergent, with persistent vegetation, and an intermittently exposed/ permanent water regime. The pond in wetland area W-3 (Post Pond) has been drained and enlarged. When filled, the pond takes on the characteristics of a palustrine, open water, permanently flooded, excavated wetland (USAG, 2001b).

4.7 PLANT AND ANIMAL ECOLOGY

The INRMP for Fort Detrick describes the natural resources of the Installation and provides guidance for the future management of these resources. This plan was prepared in accordance with AR 200-3 (*Environmental Quality Natural Resources - Land, Forest and Wildlife Management*, Chapter 9) and other applicable laws and regulations. The goal of the INRMP is to enhance biodiversity on a local and regional level. Implementing the program will assist in protecting the health of the ecosystem and environmentally sensitive areas; accomplishing Installation, local, regional, state, and national goals for ecosystem management and biodiversity; maintaining and improving public relations; and increasing coordination with local, state and Federal agencies (USAG, 2001b).

Most of the ecosystems at Fort Detrick have been highly altered by urbanization and human activities. Much of the native vegetation has been destroyed or displaced by species that are more tolerant to disturbances. The three remaining types of natural communities on the Installation are upland forests, grasslands, and wetland/riparian communities. Fort Detrick maintained approximately 500 acres of pasture, grassland, forested areas, and experimental agricultural fields as of 2001 (USAG, 2001b).

4.7.1 Vegetation

The Fort Detrick area was originally covered by an oak-hickory hardwood forest. Trees characteristic of this forest type include northern red oak, black oak, scarlet oak, white oak, chestnut oak, and several species of hickories. Other trees associated with this forest type include yellow poplar, red maple, black walnut, and dogwood. Many species including sassafras, sourwood, wild grape, and poison ivy compose the understory of oak-hickory forests (USAG, 2001b). Appendix I provides a list of the natural and introduced vegetative species at Fort Detrick (USAG, 2001b).

Areas A and B both have large open fields. The large open fields of Area A are dominated by alfalfa, tall fescue, and bromegrass. Area B is composed of pasture land with bluegrass, fescue, and other common grasses and forbs typical of the region (USAG, 2001b).

There are 10 natural woodlots of about 58.1 acres, approximately 28.7 acres of forest plantations that have been established on both Area A and B, and 18.5 acres of recently planted forest stands (USAG, 2002a). Area A contains three forest blocks, which vary in size from 12 to 14 acres and are remnants of the oak-hickory hardwood forests that originally covered Fort Detrick (see Figure 4-11). Forest Blocks 1 and 2 have little developed understory and contain rows of same species plantings, pine, spruce, scarlet oak, red oak, and Siberian elm. Block 1 is the largest and contains the most floral diversity. Block 3 covers a small hill characterized by some natural growth and understory development as well as some plantings. This area has been used for dumping of tree trimmings, stumps, and other debris in the past. Block 3 is the smallest of the three forested areas in Area A (USAG, 2001b).

Area B consists of two forest blocks: Block 1 and Block 2 (see Figure 4-12). Forest Block 1, the larger of the two, is a planted grove with an immature understory and minimal species diversity. Forest Block 1 is located on the extreme western side of Area B. Forest Block 2 has a wide variety of species inhabiting its well-developed understory. Commonly found trees in Forest Block 2 include red maple, black walnut, sycamore, and white oak. Commonly occurring forbs and vines in Block 2 include greenbrier, apple, and poison ivy. The most natural stand of trees at Fort Detrick exists in Block 2 on Area B. Two riparian areas are found along the eastern and southern sides of Area B. One riparian area surrounds the segment of Carroll Creek that cuts through the eastern side of Area B. The second riparian area surrounds the southernmost unnamed tributary of Carroll Creek. Both riparian areas contain large cottonwoods (USAG, 2001b).

A small riparian area consisting of planted willow, alder, and elderberry, is located downstream from the Nallin Farm Pond spillway in Area A. These plantings are relatively recent and therefore little growth has occurred. The area has been fenced to prevent damage from mowing. There are two riparian areas located in Area B. These riparian areas are associated with branches of Carroll Creek and border the southern and eastern borders of Area B. Both riparian

areas in Area B are dominated by large cottonwoods. The riparian zone located along the southern boundary of Area B is essentially a single row of trees that follow the creek. Mowing along the stream edge is a problem because of the softness of the soil. There is no evidence of regeneration in the riparian area and gashes and gouging from the mowing machinery is evident on the cottonwoods. The area adjacent to Carroll Creek in the extreme southeastern corner of Area B consists of approximately 1,000 sapling-sized trees planted in early 1997. The second riparian zone in Area B is located along the eastern boundary of Area B. This riparian area is more developed with a more mature understory and evidence of re-growth (USAG, 2001b).

Maintenance of forest blocks includes mowing and herbicide application during the first three growing seasons of a recently planted stand (USAG, 2002a). These practices reduce grass competition with the seedlings and remove meadow vole habitat, considered the single most damaging factor of forest plantations (USAG, 2002a). Deer exclosures have also been used to reduce the impact of deer browsing on the seedlings.

Fort Detrick Forestation Plan

Existing forestation on Fort Detrick includes 40.14 acres and 30.82 acres, respectively, on Area A and Area B (total = 70.96 acres of existing forest). The Maryland Forest Conservation Act was passed to prevent further loss of forest due to construction. This act requires identification of existing forest stands, protection of the most desirable tree stands and establishment of areas where new forests can be planted (Natural Resource Article 5-1605; COMAR 08.18.04). Fort Detrick falls under the Land Use Type “Institutional Development Area” that includes schools, colleges, universities, and military Installations. Under this land use, there is an afforestation threshold of 15%. The Maryland Forest Conservation Act requires that Fort Detrick have a forest conservation plan, participate in the afforestation/forestation process, and sign a forest maintenance agreement. Any construction project that occurs on the Installation and disturbs over 40,000 sf (0.92 acres) of land must mitigate the disturbance through forestation of 15 percent of the equivalent surface area. When clearing of the forested land occurs, the cleared forested area is replaced at a planting grade of 2 acres for every acre removed. MDNR must approve forestation plans before the project can break ground. The Forest Service can visit Fort Detrick at any time to inspect for compliance. There is a minimum two-year agreement with MNDR to ensure survivability. There must be a 65% survival rate at the end of a two-year period after planning. Planting can occur from the beginning of the project to the end and will require 436 trees per acre (Boyland, 2003d).

4.7.2 Wildlife

The number of wildlife habitats on Fort Detrick is limited due to human activities and urbanization. Faunal assemblages are predominantly composed of species that are adapted to the living conditions in urban, suburban, and agricultural habitats; though some species typical of the oak-hickory and northern hardwood forest associations are present in the forested areas of Fort Detrick (USAG, 2001a).

4.7.2.1 Birds

Bird diversity on Fort Detrick is highly dependent on the availability of suitable, unfragmented avian habitats. The Installation encompasses a variety of ecosystems, including forests, riparian zones, and agricultural fields, that can serve as habitat for a potentially great variety of bird

species both during the breeding season and during the winter months. In the past, 225 species of birds were observed in Frederick County (Iliff et al, 1996 and National Audubon Society Christmas Bird Count Data from 1960 to 1986 compiled in USAG, 2001a). An avian census of all forested habitats at Fort Detrick, which was conducted in June 1997, found 52 species of birds on Area A. Forest Block 1, which is the largest forest on Area A, contained 40 different species and was the most diverse habitat on Fort Detrick (USAG, 2001a). The most common birds identified at Area A during the 1997 census were: the house wren *(Troglodytes aedon)* (49 occurrences), the northern cardinal *(Cardinalis cardinalis)* (43 occurrences), the American crow *(Corvus brachyrhynchos)* (34 occurrences), and the gray catbird *(Dumetella carolinensis)* (32 occurrences) (USAG, 2001a). A detailed list of bird species observed in Frederick County, Maryland is provided in Appendix J.

4.7.2.2 Mammals

Fort Detrick lies in a geographic region that falls within the potential range of 57 mammal species (USAG, 2001a) (see Appendix K). However, due to a lack of suitable habitats on the Installation, the actual number of mammal species that inhabit Fort Detrick is much smaller. A mammalian survey based on live trapping, scent station track counts, and direct observations was conducted in June of 1997 and recorded a total of 12 mammals for Fort Detrick. The following species were identified during the survey: white-tailed deer *(Odocoileus virpinianus),* meadow vole *(Microtus pennsylvanicus),* eastern cottontail *(Sylvilugus floridanus)*, gray squirrel *(Sciurus carolinensis)*, eastern chipmunk *(Tamias striatus)*, fox squirrel *(Sciurus niger)*, woodchuck (*Marmota monax)*, white-footed mouse (*Peromyscus leucopus)*, deer mouse (*Peromyscus maniculatus)*, opossum *(Didelphis virginiana)*, raccoon *(Procyon Iotor)*, and an unidentified species of bat. In addition, visual observations from resource management personnel suggest the presence of red foxes (*Vulpes vulpes*) on the Installation (USAG, 2001a).

4.7.2.3 Fishes

The Monocacy River, Carroll Creek, and the Nallin Farm Pond are the three major bodies of water in the vicinity of Fort Detrick that support freshwater fisheries (see Section 4.5.1). The Nallin Farm Pond covers approximately 3.3 acres. A 1994 assessment of the pond concluded that there were nine species of fish present in Nallin Farm Pond. Largemouth bass *(Micropterus salmoides),* smallmouth bass *(Micropterus dolomieui)*, bluegill sunfish *(Lepomis macrochirus)*, pumpkinseed sunfish (*Lepomis gibbosus)*, green sunfish *(Lepomis cyanellus)*, rainbow trout *(Oncorhynchus mykiss)*, yellow bullhead *(Ictalurus natalis)*, golden shiner *(Notemigonus crysoleucas),* and carp *(Cyprinus carpio)* are the common species found in the pond (USAG, 2001a).

The stormwater management pond, adjacent to Building 1434 (Health Clinic), is not a suitable habitat for a wide variety of aquatic species. The only known species in the pond are mosquito fish *(Gambusia affinis)*, that were stocked to control mosquito larvae (Boyland, 2002). Post Pond is located in the southwestern corner of Area B and has a surface area of approximately 0.23 acres. This pond appears to have good populations of sunfish and possibly bass, however, it has never been fully studied in terms of water quality, habitat, and fish species present. Currently, copper sulfate is added to the pond to control algae. Future plans include developing the habitat of this pond to support other populations of fish species (USAG, 2001a).Carroll Creek transects Area B of Fort Detrick and comes within approximately 300 ft. of the western boundary of Area A. This stream is designated as Use III-P (COMAR 26.08.02) by the State of

Maryland, which indicates high water quality and the potential of the water body to support growth and propagation of trout. Good water quality and the large variety of habitats found in the creek support a considerable variety of fish species including rosyside dace (*Clinostomus funduloides),* carp *(Cyprinus carpio)*, blacknose dace *(Rhinichthys atratulus)*, longnose dace *(Rhinichthys cataractae)*, bluntnose minnow *(Pimephales notatus)*, creek chub *(Semotilus atromaculatus)*, pearl dace *(Margariscus margarita)*, white sucker *(Catostomus commersoni),* yellow bullhead *(Ameiurus natalis)*, redbreast sunfish *(Lepomis auritus)*, bluegill *(Lepomis macrochirus)*, largemouth bass *(Micropterus salmoides)*, fantail darter *(Etheostoma bellare)*, Potomac sculpin *(Cottus girurdi)*, and rainbow trout *(Oncorhynchus mykiss)*. (USAG, 2001a).

The State of Maryland designated the Monocacy River as a Use IV-P (COMAR 26.08.02) warm water fishery. This designation is assigned to waters that can serve as recreational trout waters and public water supply. Water quality in a Use IV-P river must be high enough to support adult trout for put-and-take fishing. Fish populations are actively managed by periodic stocking and seasonal catching. Previous surveys identified at least 43 species of fish in the river. Common species in the middle segment of the Monocacy River include smallmouth bass *(Micropterus dolomieui)*, black crappie (*Pomoxis nigromaculatus),* redbreast sunfish *(Lepomis auritus)*, bluegill *(Lepomis macrochirus)*, catfish *(Ictalurus sp.)*, shorthead redhorse *(Moxostoma macrolepidotum),* white sucker *(Catostomus commersoni),* and various species of shiners and minnows, with small populations of white crappie (*Pomoxis annularis)* and brown trout *(Salmo trutta)* (USAG, 1998a).

4.7.2.4 Herptofauna

Fort Detrick lies within the geographical range of 60 species of reptiles and amphibians. Area A has a small number of potentially suitable habitats for herptofauna, however, no formal herpetological survey has been conducted at the Installation. Incidental observations by personnel conducting the bird and mammal surveys in June of 1997 and May 2001 suggest the presence of leopard frogs *(Rana pipiens)* and bull frogs *(Rana catesbeiana)*, rough green snake (*Opheodrys aestivus*), as well as painted turtle (*Chrysemys picta*) on the Installation (USAG, 2001a; USAG, 2002a).

4.7.3 Special Status Species

The altered environment of Fort Detrick provides little high quality habitat for most species of wildlife. There are no records for Federal or state listed rare, threatened, or endangered species of plants or animals within the boundaries of the Installation (USAG, 2001b). A survey for rare, threatened and endangered small mammals and a survey for rare, threatened, and endangered plants was prepared by the Maryland Natural Heritage Program of the Maryland Department of Natural Resources in February 2002, which found no evidence of special status species on Fort Detrick. Although no special status species were identified the open areas and fields of the Installation may still provide sufficient habitat for endangered or declining bird species including the Savannah Sparrow (*Passerculus sandwichensis*), listed as declining populations in Maryland, the Loggerhead Shrike (*Lanius ludovicianus*) and Upland Sandpiper (*Bartramia longicauda*), listed as endangered in Maryland (Slattery, 1997; USAG, 2001b). The status of species may change over time as a result of changes in listing status for Federal and state threatened and endangered species, and as a result of new surveys of the Installation (USAG, 2001b).

4.8 AIR QUALITY

4.8.1 Frederick Region Classification

Fort Detrick lies within the Central Maryland Air Quality Control Region (Area II). MDE's Air and Radiation Management Administration (ARMA) regulates the air quality of Frederick County. The USEPA adopted the National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) to control a select group of widely occurring pollutants. These standards, presented in Table 4-4, establish safe concentration levels for each criteria pollutant. The six NAAQS criteria pollutants include carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), ozone (O_3), lead (Pb), and particulate matter less than 10 microns in aerodynamic diameter (PM_{10}).

Table 4-4. National Ambient Air Quality Standards.

Criteria Air Pollutant	Primary (Health Related)		Secondary (Welfare Related)	
	Averaging Time	*Concentration*	*Averaging Time*	*Concentration*
CO	8-hour Average	10 mg/m^3	N/A	No Secondary Standard
	1-hour Average	40 mg/m^3	N/A	No Secondary Standard
NOx	Annual Arithmetic Mean	100 µg/m^3	N/A	100 µg/m^3
O_3	Maximum Daily 1-hour Average	235 µg/m^3	Maximum Daily 1-hour Average	235 µg/m^3
	8-hour Average	157 µg/m^3	8-hour Average	157 µg/m^3
Pb	Maximum Quarterly Average	1.5 µg/m^3	Maximum Quarterly Average	1.5 µg/m^3
PM_{10}	Annual Arithmetic Mean	50 µg/m^3	Annual Arithmetic Mean	50 µg/m^3
	24-hour	150 µg/m^3	24-hour	150 µg/m^3
SO_2	Annual Arithmetic Mean	80 µg/m^3	3-hours	1300 µg/m^3
	24-hour	365 µg/m^3	24-hour	N/A

Note: mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

Under the CAA, a geographic area in which levels of a criteria air pollutant meet the health-based primary standard (i.e., NAAQS) for the pollutant is designated an attainment area. A nonattainment area is a geographic area in which the level of a criteria air pollutant is higher than the level allowed by the NAAQS. One single location may be in attainment for one pollutant

and simultaneously have unacceptably high levels of another criteria air pollutant. The CAA requires that attainment areas implement a plan to prevent degradation. The prevention of significant deterioration (PSD) plan is designed to keep attainment areas in attainment status.

The 1990 CAA established five categories based on severity for nonattainment and set new deadlines for each category to achieve attainment. The five categories are extreme, severe, serious, moderate, and marginal. One of the goals of the CAA is to set attainable goals/deadlines for air quality control regions to reach attainment status.

In general, the air quality of Frederick County, including Fort Detrick, is good. Currently, all of Maryland is in attainment for all criteria pollutants except for ozone (MDE, 2002c). Peak one-hour ozone levels have been recorded in Frederick County from an ozone monitoring station at the Frederick County Health Department located approximately 0.5 miles from Fort Detrick. This station has been measuring ozone since 1995 and indicated that ozone levels exceeded the NAAQS criteria level of 125 ppb for more than one day in a given year on September 14, 1998 and on July 16, 1999 (MDE, ARMA, 2002a).

Title III of the CAA regulates emissions of hazardous air pollutants (HAPs) not covered under NAAQS regulations. Under the auspices of the CAA, the State of Maryland has established an emission standards program regulating toxic air pollutants (TAPs). No outstanding compliance issues for HAPs or TAPs were identified at Fort Detrick according to a 1992 inventory of emissions from existing sources (U.S. Army Environmental Hygiene Agency, 1992). Since emission data for Fort Detrick indicates that TAP emissions are not more than 10 tons per year for any single TAP or more than 25 tons per year for any combination of TAPs, the Installation is not required to meet enhanced emission control requirements for HAPs or TAPs (USAG, 1998a; Wolf, 2002b).

The provisions of the CAA are only applicable to major sources (e.g., incinerators, fossil-fueled boilers, and laboratories). According to Title V, a facility is considered a major source if its potential emissions from stationary sources exceed the regional threshold levels for regulated air pollutants established by the USEPA. Regulated pollutants are the criteria air pollutants or their precursors (e.g., VOCs as precursors to O_3), hazardous air pollutants (HAPs) as specified in Title III of the CAA, TAPs as specified in COMAR 26.11.15, and Class I and Class II O_3 layer depleting substances (ODS) as specified in Title V of the CAA. Potential emissions are those that would be emitted assuming a maximum operating schedule of 24 hours per day, 365 days per year, at the unit's maximum capacity. By definition, potential emissions are equal to or greater than actual emissions. The threshold levels for a major source located in Frederick County are:

- 100 tons per year (tpy) of CO
- 25 tpy of NOx
- 100 tpy of Pb
- 100 tpy of PM_{10}
- 100 tpy of SO_2
- 25 tpy of VOCs
- 10 tpy or more of any one HAP or
- 25 tpy of any combination of HAPs

Title V of the CAA requires all major sources of criteria air pollutants or their precursors to file a Part 70 application for an operating permit. A Title V permit application must be submitted to

MDE for facilities located in Frederick County with emissions that exceed the threshold levels listed above.

4.8.2 Fort Detrick Air Pollution Sources

Fort Detrick is located in a severe O_3 non-attainment area. This designation is primarily based upon emissions from vehicular traffic in the Frederick area, which cause O_3 concentrations to periodically exceed the NAAQS during warm weather months (USAG, 1997a). Fort Detrick is located in an area deemed to be in attainment for PM_{10}, NOx, SO_2, CO, and Pb. Stationary sources of air pollution on the Installation currently include two medical waste incinerators, two general/medical waste incinerators, and five large boilers. There are also two inactive pathological waste incinerators, many small boilers, and several oil-fired standby generators (MDE, 2000b; USACOE, 1997a). Commuter and on-site traffic constitute the mobile sources of air pollution at the Installation. According to the Provost Marshall's Office (PMO), there are 20,510 vehicles registered at Fort Detrick, which includes vehicles registered to personnel living and working on-post and to those living off-post and working on-post. Recent traffic counts indicate that approximately 12,163 vehicles per day (vpd) pass through the Installation gates at Fort Detrick (STV, Inc., 2003c).

Fort Detrick is ranked as the third largest NO_x source in Frederick County with the majority of the Installation's NO_x emissions originating from the central boiler plant and incinerator and generator facilities (see Table 4-5). According to Title V of the CAA, Fort Detrick is considered a major source of air pollution because of criteria pollutants (NO_x and SO_2) emissions exceeding thresholds of 25 and 100 tpy, respectively (see Table 4-6). This required the Installation to submit a Part 70 Title V permit application to the MDE in July 1997 for operation of the air emission sources (USAG, 1998a); MDE provided a "pre-draft" permit for review in August 2003.

As of December 1, 2001 the USEPA took over the Title V permitting process from the MDE. Therefore, the USEPA requires a Part 71 Title V application be submitted for approval of the operation of air emission sources at major source facilities until the MDE corrects these deficiencies (MDE, ARMA, 2002b). Fort Detrick submitted the Part 71 Title V permit application to the USEPA on June 3, 2002 (Wolf, 2002a).

Table 4-5. Major Air Emissions Sources in Frederick County, MD.

Company	VOC (tpy)	NOx (tpy)	HAPS (tpy)	PM or TSP (tpy)	SOx (tpy)	CO (tpy)
Lehigh Cement-Woodsboro	1	163	0	222	2017	110
EASTALCO-Frederick	15	69	270	299	3557	23983
ESSROC Materials, Inc.	4	1846	10	382	1151	0
Redland Brick-Rocky Ridge Plant	1	9	0	6	1	31
Fort Detrick	3	118	0	35	444	25
George Weston Bakeries	49	3	0	0	0	3
Canam Steel	170	6	0	2	0	0
Reichs Ford Sanitary Landfill	3	6	0	0	2	6

Source: MDE, ARMA, 2002b.

Table 4-6. Actual Criteria Air Pollutant Emissions at Fort Detrick in 2002.

Pollutant	Boilers/ Heaters	Incinerators	Generators	Tanks	Surface Coating Operations	Total (tons)
CO	27.05	0.26	1.59	0	0	28.87
NO_x	80.11	3.44	6.02	0	0	89.57
PM_{10}	19.12	10.69	0.11	0	0	29.92
SO_2	276.42	2.78	0.10	0	0	279.3
VOCs	2.08	0.15	0.15	0.74	0	3.12

Source: Wolf, 2003a.

Fort Detrick has minimum emissions levels for several pollutants that if surpassed will require the implementation of a mitigation program. The minimum levels that would determine if a mitigation program would be necessary are as follows:

- VOCs 25 tpy
- NO_X 25 tpy
- PM_{10} 25 tpy
- SO_X 40 tpy
- CO 100 tpy
- Pb 0.6 tpy
- Hydrogen sulfide 10 tpy
- Asbestos 0.007 tpy
- Beryllium 0.0004 tpy
- Mercury 0.1 tpy
- Vinyl chloride 1.0 tpy
- Fluorides 3.0 tpy
- Sulfuric acid mist 7.0 tpy
- Total reduced sulfur 10 tpy
- Reduced sulfur compounds 10 tpy

A summary of Fort Detrick's actual annual criteria air pollutant emissions from stationary sources in 2002 are presented in Table 4-6. Fort Detrick as a whole is considered a source; therefore all activities are combined to determine regulatory compliance.

The CAA requires that NSR evaluations be prepared and approved before construction or installation of any new permitted major sources or any major modifications of permitted major sources in non-attainment areas that have the potential to cause significant increases of criteria pollutants (NO_x, SO_x, CO, Pb, VOCs, PM). Air quality permits to construct are required for generators greater than 1,000 horsepower (hp) or 746 Kilowatt (kW) and for fuel burning equipment greater than or equal to 1 Million British Thermal Unit (MMBtu)/hour (hr). Air quality permits to operate are required for fuel burning equipment and hot water heaters with maximum rated capacities of 50 MMBtu/hr or more (Wolf, 2002d). Several new construction projects approved on Fort Detrick will increase air pollutant emissions and may require mitigation measures.

4.8.3 Hazardous and Toxic Air Pollutants

The State of Maryland regulates hundreds of additional chemicals beyond the 192 EPA listed HAPs in Title III of the CAA. A source is considered a TAP if the Occupational Safety and Material Safety Data Sheets (MSDS) define it as a health hazard. The State of Maryland emission standards program regulating TAPs is more stringent than Federal programs.

MDE's listing of TAPs includes all of the Title V HAPs. The Fort Detrick Air Program Manager recently calculated actual emissions from Fort Detrick, including TAPs, using operational data from calendar year 2002. TAP emissions were evaluated considering all sources of emission including those that are fugitive (e.g., gasoline storage tanks). Appendix L provides an emissions summary of 2001 actual TAP emissions from Fort Detrick Areas A, B, and C.

The primary sources of TAP emissions on the Installation are the boilers and fuel storage and dispensing activities. These emission inventories indicate that Fort Detrick is not required to meet enhanced emission control requirements for HAPs or TAPs because emissions are not more than 10 tpy for any single TAP or more than 25 tpy of any combination of TAPs (Wolf, 2003a).

4.9 HISTORICAL AND CULTURAL RESOURCES

4.9.1 History

Settlement of the Frederick County area began during the early 1700s. The town of Frederick was chartered in 1735 and the county was created on June 11, 1748 by the Maryland Provincial Assembly. The region around the site occupied by Fort Detrick was important in many events in the history of the United States, including the French and Indian War, the Revolutionary War, and the Civil War (USACOE, 2000a).

In 1929, Frederick County opened a small municipal airfield on 90 acres of land north of the city. The airfield was leased to the Maryland National Guard in 1931 for a summer training camp. The field was named Detrick Field in honor of Major Frederick Lewis Detrick, a Frederick native and WWI veteran. The Army Air Corps leased the property to train its military pilots in 1940 and abandoned the airfield after mobilization for WWII began. The U.S. Biological Warfare Program was established in 1941 by President Roosevelt and in 1943 the Army Chemical Warfare Service purchased Detrick Field from the City of Frederick. The site was established for research and development of biological warfare techniques and agents for offensive and defensive purposes. By 1945, Camp Detrick consisted of 245 buildings, including housing for 5,000 workers. Only 80 of those buildings remain (USACOE, 2000a).

Camp Detrick was designated a permanent Installation shortly after WWII. In 1956, Camp Detrick was formally designated as Fort Detrick following the purchase of Area C (the water and sewage plants) and Area B (the outdoor test area) in 1944, and additional portions of Area A between 1946 and 1952. Following the discontinuation of the offensive biological warfare research program in 1969, former biological research facilities were either converted to other biomedical research activities or to administrative purposes. In 1972, a new cancer research mission was established at Fort Detrick with the arrival of the NCI-Frederick (Covert, 2000).

4.9.2 Cultural Resources

The National Historic Preservation Act (NHPA) and other Federal laws and regulations require DA to protect prehistoric and historic cultural resources that are located on DA property. AR 200-4 (Cultural Resources Management) directs the Installation to maintain an Integrated Cultural Resources Management Plan (ICRMP). The ICRMP replaces the Cultural Resource Management Plan (CRMP) that was prepared under a previous Army regulation. The ICRMP provides guidance for complying with the NHPA of 1966 and other applicable Federal laws and regulations. The ICRMP applies only to those properties controlled by DA at the Installation (USACOE, 2000a). Based on an inventory and evaluation of all Installation structures constructed prior to 1946, four structures on Area A are currently listed in the National Register of Historic Places (NRHP) and several sites have become eligible for a listing on the NRHP (USACOE, 2000a, USAMRMC, 2001).

4.9.2.1 Current NRHP-listed Sites

Three of the four NRHP-listed sites are located in the Nallin Farm complex at the northeast corner of Area A. The Nallin Farm House (Building 1652) and its associated Bank Barn (Building 1655) and springhouse (Building 1661) are listed for their local significance in nineteenth century agriculture and architecture. The Nallin Farm House was constructed circa 1830 during the Agricultural-Industrial Transition Period (1815-1870) and possesses characteristics of both, a typical regional farmhouse and Federal architecture (USACOE, 2000a; Goodwin and Associates, 2002a). The Federal architectural features of the Nallin Farm House include the rectangular-shaped, two-story house with sash windows and a low-pitched gable or hip roof. The house has a balanced composition with minimal projections. Classical, delicate ornamentation decorates the exterior of the house (Goodwin and Associates, 2002a). The Nallin Spring House and the Bank Barn are representative of a construction period that dates before 1798. The Spring House is of fieldstone construction and is characterized by high walls and a wood-shingled roof. The Bank Barn exemplifies the typical characteristics of local Piedmont stone and timber construction of the late 18th century (Maryland Historical Trust, 2003).

The One-million Liter Test Sphere (Building 527) is listed in the National Register for its national significance in the scientific development of aerobiology and for its unique structural engineering. The facility consists of a 40-foot diameter, gas-tight, steel sphere that was used for aerobiological studies of pathogenic agents from 1951 to 1970 (Maryland Historical Trust, 2003). The One-million Liter Test Sphere is located on the NCI-Frederick and is no longer under the control of the DA. Although the One-million Liter Test Sphere is located within the boundaries of Fort Detrick, this historical site is owned by NCI-Frederick.

4.9.2.2 NRHP-eligible Sites

The following properties also have been determined eligible for listing on the National Register: Buildings 190, 375, 1301, 1302, 1303-06, 1412, 1414, 1415, 1653, 1656, and the tarmac. Building 190, the Boiler Plant, was constructed in 1952 by the Army to supply steam heat to Fort Detrick facilities. Building 190 is an important component of the mechanical infrastructure at Fort Detrick (USACOE, 2000a). This building is located to the south of Miller Street and approximately 200 feet from the southern edge of the NCI-Frederick campus.

Building 375, the Steam Sterilization Plant, was constructed by the Army in 1953 and continues to function as the central steam sterilization and decontamination plant, an important component

of the Installation's infrastructure (USACOE, 2000a). The building is an irregular-shaped brick building designed for utilitarian purposes. The building is connected to the NCI-Frederick property through a series of elevated steam pipes that extend through the building's roof (USACOE, 2000a). Building 375 is located at the western boundary of Area A.

Buildings 1301, 1302, and 1303-06 were constructed in 1956 to support research and testing by the Crops Research Division (USACOE, 2000a). Research was aimed at developing more robust and productive crops, but was also conducted to evaluate impacts of biological and chemical warfare agents on plants and crops. Building 1301, a large, two-story brick building, and Building 1302, a one-story wing extending from the rear of Building 1301, continue their original function as research laboratories (USACOE, 2000a). The USDA currently leases both Buildings 1301 and 1302. Buildings 1303-1306 are greenhouses located behind Buildings 1301 and 1302, which are also used by the USDA for its ongoing research program.

Buildings 1412 and 1414 were declared eligible for listing on the NRHP in 2001 (USAMRMC, 2001). Building 1412, constructed in 1958, was a special operations building designed specifically to support biological warfare research during the Cold War era; and Building 1414 was an exhaust air incinerator sterilization building associated with Building 1412 (USAMRMC, 2001). Building 1412 is constructed with cinder block walls and relieved by concrete pillars. This building is still used as a laboratory with upgraded modern equipment (USACOE, 2000a). Building 1415 was built in 1959 as a guard shack, a square one-story brick building, it is currently used for administrative purposes (USACOE, 2000a). This group of buildings is considered exceptionally significant as physical examples of the Army's Cold War policies, illustrating that aspect of American Military History (USAMRMC, 2001).

The tarmac was a portion of an airfield in the southwestern portion of Area A, prior to the establishment of Fort Detrick. In 1929, the City of Frederick established a municipal airport and later that year, leased the property to the U.S. Government as an emergency landing field (NCI-Frederick and USAG, 2003c). It became a permanent training field for the Maryland National Guard in 1931 and was named Detrick Field. Beginning in 1939, the Federal government built a large hanger (now Building 201) and a series of wooden, prefabricated barracks and administrative buildings, many of which still remain. A concrete tarmac was constructed from Building 201 and is now known as Hamilton Street. The tarmac runs from west to east and terminates on Schertz Street. A grass runway extended from the tarmac from west to east and transversed the current parade grounds in front of Building 810. The last airplanes left Detrick Field in early 1942 (Covert, 2000).

4.9.3 Archeological Resources

Fort Detrick is located in the Monocacy River Drainage Basin of the Piedmont Province, which is part of Maryland Archeological Unit 17. The 1992 Cultural Resource Management Plan (CRMP) for the Installation determined that approximately 625 acres in Areas A, B, and C might have high potential for archeological resources (USACOE, 1992). A Phase I Archeological Survey was performed at Fort Detrick from October 1992 through January 1993 (Goodwin and Associates, 1993). This study was conducted in accordance with recommendations set forth in AR 420-40, *Historic Preservation,* and the CRMP for the Installation. This investigation was intended to assist the DA in carrying out responsibilities outlined in Section 106 and 110 of the NHPA.

Of the 625 acres investigated during the Phase I study, a total of eight sites were discovered and/or examined: 18FR679, 18FR680, 18FR681, 18FR682, 18FR683, 18FR684, 18FR685, and 18FR74 (see Figure 4-13 and Figure 4-14). The survey documented one prehistoric site (18FR679) and redefined the boundaries of a previously identified prehistoric site on Area C (18FR74). Three historic sites: 18FR680, 18FR681, and 18FR682 were also documented. The Phase I study identified 3 sites that did not warrant further evaluation because they lacked integrity and archeological research potential. These sites are Prehistoric Archeological Site 18FR679 and Historic Sites 18FR680 and 18FR681 (USACOE, 2000a). The Phase I archeological survey also identified five sites that may retain integrity and archeological research potential. Archeological evaluations were performed on the Stonewall Jackson Beall Site (18FR683), the Nallin Farm Site (18FR684), the Wide Pastures Farm Site (18FR685), the Lime Kiln Site (18FR682), and a prehistoric site on Area C (18FR679) (USACOE, 2000a).

Nineteenth century artifacts and one piece of pearlware dated between 1780 and 1830 were found in the Stonewall Jackson Beall Site (18FR683), and remnants of historic activity were found in the adjacent yard. Nineteenth and twentieth century artifacts were recovered from the Wide Pastures Site (18FR685), a 45 m x 91 m area. This site contained an Estate House was destroyed in 1977 and the Carriage House (Building 1001), which was demolished in 2000 (Boyland, 2003e).

The Nallin Farm Site (18FR684) located in Area A, consists of Buildings 1652, 1655, 1661, 1653 and 1656. The site covers 40 m x 40 m of the Nallin Farm Complex, which is located at the northeast corner of Nallin Farm Pond Drive. Building 1652 (the Nallin Farm House), 1655 (the Bank Barn) and 1661 (the springhouse) are currently listed in the NRHP (see Section 4.9.2). In addition to these buildings, the collective Nallin Farm Site has been determined to be eligible for listing in the NRHP. Artifacts dating from the eighteenth and nineteenth century have been recovered from the yard. The presence of materials dated prior to construction of the farm complex may indicate that a previous establishment was present on the site (USACOE, 1993a).

A Phase II Archeological Survey conducted for this site concluded that the Nallin Farm Site is eligible for inclusion on the NRHP. The Nallin Farm Complex is being considered for designation as a historic district (USACOE, 1997b).

Further evaluations have also been conducted on the Lime Kiln Historic Site (18FR682), and Wide Pasture Site (18FR685). In 1995, a Phase II archeological survey was conducted on Historic Site 18FR682. Site 18FR682, located in Area B, is a historical lime kiln characterized by a rubble foundation, a chimney fall and an early twentieth century fill. Artifacts recovered from the site date from the late nineteenth and early twentieth centuries, except for some pieces of stoneware. Unaltered (not burnt or broken) kitchen items recovered from the kiln indicate that these items may have been placed in the kiln after production had ceased (USACOE, 1996c). Site 18FR682 may provide information on the historic occupation of the Monocacy Valley (e.g., nineteenth century farming and cottage industries). The Phase II study concluded that it does not qualify for listing on the NRHP because it lacks archeological and structural integrity. No further investigation of this site is warranted (USACOE, 2000a).

The Wide Pastures Farm Site is situated on a small hill partially within Forest Block 3. The site encompasses an area of 45 m x 91 m and was developed with a late nineteenth/early twentieth century revival-style mansion and a Carriage House. The principal structure, was the residence for Installation Commanders until it was demolished for safety reasons in 1977. The Carriage House (Building 1001) was demolished in 2000 (Boyland, 2003e). A Phase I Archeological

Survey recovered 19th and 20th century artifacts from the area and recommended formal evaluation of the site (Goodwin and Associates, 2002b). A Phase II archeological survey of the Wide Pastures Site was conducted in 2002. Although the landscape was determined to adhere to the National Register's integrity requirements, the Maryland Historical Trust deemed the Wide Pastures Site ineligible for listing in the NRHP. This decision was based on the removal of the estate and Carriage House and the significant assemblage of 19th and 20th century materials, which "does not add materially to our knowledge of rural upper class lifeways either locally or regionally" (Goodwin and Associates, 2003). No further work on this site is deemed necessary.

Historic site 18FR681, deemed lacking integrity and archeological research potential, is located on the area for the proposed NIAID IRF footprint. Items found on this site included domestic artifacts (e.g., kitchen and clothing), 18th century stoneware, 18th and 19th century creamware and pearlware, and 19th century whiteware and machine-cut nails. Because systematic shovel testing confirmed the site had been disturbed (site is confined to the disturbed modern plowzone) it was determined that this site lacked integrity and archeological research potential and did not warrant further evaluation (Goodwin and Associates, 1993).

Phase II testing is recommended for Prehistoric Site (18FR74). Site 18FR74 overlooks the Monocacy River in the vicinity of the WTP in Area C of Fort Detrick. Historic and prehistoric artifacts were recovered from the floodplain and the terrace. Cultural features and concentrations of discrete artifacts were recovered immediately downstream from the site. Portions of the materials found upstream have archeological research potential and the site is considered as eligible for listing on the NRHP (USACOE, 2000a). This location may represent an isolated activity area downstream from the main portion of Site 18FR74.

Remnants of historic activity associated with Building 1401 could be located in the adjacent yard. Site 18FR683 is located in Area A at the northeast corner of Ditto Avenue and Sultan Drive (USACOE, 1993a). Building 1401 (the Beall House) on the Stonewall Jackson Beall Site (18FR683) no longer have historic value due to the many renovations to the building and the site.

4.10 SOCIOECONOMIC ENVIRONMENT

Fort Detrick is located in the City of Frederick, Frederick County, Maryland. The population of Frederick County was 195,277 in 2000, a 30 percent increase from 1990 (U.S. Census Bureau, 2002). Growth projections predict that the population will reach more than 238,700 by the year 2010 and 282,100 by the year 2020 (Maryland State Data Center, 2003a). This substantial growth can be attributed to the expansion of the Washington and Baltimore metropolitan areas and the increase in the commuter population. The labor force commuting out of Frederick County is estimated to be approximately 39.3% of the total civilian labor force (Frederick County Office of Economic Development, 2002). The City of Frederick contains approximately 27 percent of the county's total population with total of 52,767 residents (City of Frederick Planning Department, 2002).

The estimated 2002 median household income for Frederick County was $68,200, which is more than $9,000 above the state median of $58,600 (Goldstein, 2003). The average monthly civilian labor force for Frederick County in 2002 was 108,836, of which an average of 105,659 were employed. The 2002 annual average unemployment rate in Frederick County was 2.9 percent (Maryland Department of Labor, 2003). The total number of jobs in Frederick County

has increased 24% (19,384 jobs) from 1991 to 2001 (Frederick County Office of Economic Development, 2002). Between 2001 and 2002, Frederick County boasted the highest increase in jobs in the state of Maryland with 2,846 jobs (Maryland Department of Labor, 2003). Tables 4-7 and 4-8 illustrate industrial and occupational classifications of Frederick County residents according to 2000 census data. The majority of the employment in Frederick County is related to services, retail businesses, government, construction, and agriculture.

Table 4-7. Employment Categories of Frederick County Residents.

Industrial Classification	Percent of Residents
Services	30.8
Wholesale and Retail Trade	22.4
Government	13.2
Construction	10.8
Finance, Insurance and Real Estate	8.9
Manufacturing	7.5
Transportation and Utilities	2.8
Agricultural	1.7
Other	1.9

Source: Frederick County Office of Economic Development, 2002.

Table 4-8. Frederick County Labor Force Occupational Classifications.

Occupational Classification	Population, 2000 Census	Percent of Total
Management, Professional, and Related Occupations	41,615	40.5
Service Occupations	13,235	12.9
Sales and Office Occupations	26,456	25.7
Farming, Fishing, and Forestry Occupations	452	0.4
Construction, Extraction, and Maintenance Occupations	11,481	11.2
Production, Transportation, and Material Moving Occupations	9,617	9.3
Total Employed Persons (16 years old and over)	**102,856**	**100.0**

Source: U.S. Census Bureau 2002.

The largest employer in Frederick County is Fort Detrick with 7,107 employees, followed by the Frederick County Board of Education, which currently has a staff of 3,974. As of 2002, Fort Detrick and NCI-Frederick employs 7,107 individuals, of which 1,463 are enlisted personnel (DoD, 2002). NCI-Frederick employs approximately 2,400 individuals of the total 7,107 (Fort Detrick Public Affairs Office, 2003b). Approximately, 2,500 individuals who work on the Installation are employed by USAG.

The current number of employees on Fort Detrick is 7,107. An additional 461 civilian dependents reside on the Installation (Cole, 2003). The total baseline number of employees and residents is thus equal to 7,568 people. Growth in the Fort Detrick population is expected, but not as a result of the Proposed Action. The anticipated population of Fort Detrick may increase to approximately 9,000 (an increase of 19.6%) over the next five years (see Table 4-9). This estimate assumes that the following organizations on the Installation will have additional or new staff: USAMRIID (200), NIAID (100), NCI-Frederick(400), and Other Tenants (300), or a total of 1,000 additional new employees. The number of additional civilian dependents from the RCI is assumed to be three additional per household (3 x 161 units = 483). Impacts of the potential growth of the Fort Detrick population will be examined in future NEPA analyses.

Table 4-9. Projected Population Growth for Fort Detrick.

Population Component	Number of People
Current Employees	7,107
Civilian Dependents	461
Current Installation Population Subtotal	**7,568**
Civilian Dependents (RCI)	483[1]
USAMRIID	200
NIAID	100
Other Tenants	300
NCI	400
Subtotal Potential Growth	1483
Projected Installation Population Total	**9,051**

[1]Assumes three civilian dependents per household.

EO 12898 (*Federal Actions to Address Environmental Justice in Minority and Low Income Populations*) requires Federal agencies that prepare NEPA documents to address any significant adverse impacts of Federal projects on minority or low-income populations. According to 2000 census data, the population of Frederick County is 89.3 percent Caucasian, 6.4 percent African-American, 1.7 percent Asian, 0.2 percent American Indian and Alaska Native, and 0.9 percent reported as some other race. Approximately 2.4 percent of the county's population was of Hispanic origin in 2000 (U.S. Census Bureau, 2002). Census block group 7507-3 is a statistical area roughly defined by Fort Detrick on the north and west, Seventh Street on the southwest, Taney Avenue on the southeast, and Opossumtown Pike on the east. The population of this census block group in 2000 was 74.2 percent Caucasian, 19.0 percent African-American, 2.5 percent Hispanic, 2.8 percent Asian, 1.2 percent Native American, and 0.3 other reported race (U.S. Census Bureau, 2002).

The U.S. Census defines the poverty level as the income that is considered too low to meet essential living requirements without regard to the local cost of living; based on family size, age of householder, and the number of children less than 18 years of age. According to 2000 census data, 7.4% of all persons within the City of Frederick were living below the poverty level (U.S. Census Bureau, 2002). The poverty status in 1999 within the census block group 7505-3 revealed 15.8% of all persons were living below the poverty level (U.S. Census Bureau, 2003).

A “poverty area” is defined by the Census Bureau as an area in which at least 20% of the population lives below the poverty level. Therefore, the City of Frederick is not considered a low-income community under EO 12898.

4.11 HOUSING

As of March 2000, Frederick County had 74,300 housing units. This reflected an average increase of about 2,000 dwelling units per year throughout the 1990s (Frederick County Department of Planning and Zoning, 2000). Construction of new housing has slowed somewhat in recent years. In 2002, 1,364 new buildings, comprising 1,578 housing units, were authorized in Frederick County. Of these housing units, only 14 were authorized for the City of Frederick (Maryland State Data Center, 2003b).

Of the average 1,242 active duty personnel assigned to Fort Detrick in fiscal year 2001, 356 were living on the Installation. The number of family members accompanying these personnel was 2,502 (Canny, 2002). More than 71 percent of the active duty personnel at Fort Detrick live off-post.

Fort Detrick offers limited on-Installation family housing for its military personnel. Of the 191 existing family housing units occupied by service members and their dependants, 125 units are designated for enlisted personnel and 30 units consisting of 2, 3, or 4 bedrooms are for officers. Among these 30 units are 4 units for high-ranking officers (Buildings 800-802, and 1652) and 26 other units (Buildings 1867-1879). The remaining 161 units consist of housing for Junior Noncommissioned Officer (NCO), Senior NCO, Colonel, and Colonel/Warrant Officers. These units have a 99 percent occupancy rate. Waiting lists for family housing units range from 8 to 26 months. On average, 130 officers and enlisted personnel are on the waiting list for on-post housing (Fort Detrick Standard, 2003).

On-post UEPH consists of a one 3-story barracks containing approximately 56 units (Building 1430) and five 48-unit barracks (Buildings 1533-1538) (Federline, 2003a). Occupancy rates for these units range from 75 percent to 88 percent (Cole, 2003). Building 1430, currently used for UEPH space, will become available for renovation following completion of the FY 2003 barracks complex located in the southern area of Fort Detrick (STV, Inc., 2002). The proposed conversion and renovation of Building 1430 will make administrative space available to USAMRAA and USAMMDA (STV, Inc., 2002).

Transient personnel facilities include 5 family lodging quarters, 16 visiting officers’ quarters, and one distinguished visitor apartment.

The new MCA enlisted family housing units consist of modern design quadraplexes of two-story townhouses, 36 units altogether. The total area of development is approximately 35 acres. Each unit includes one attached, covered carport or garage, and one uncovered off-street parking space. The design provides for exterior storage space and a trash container enclosure. Each unit contains 1,193 square feet of net usable living space with a main entry hall, living room, family room, dining room, kitchen, and half-bath on the first floor, and three bedrooms and two full bathrooms on the second floor. A laundry room, utility and storage area is provided, and the quarters are equipped with individual central heating and air conditioning units and hard-wired interconnected smoke detectors. Two units are one-story and handicapped accessible.

The new family housing units also provide all appliances and supporting facilities, such as utilities, electric service, storm water drainage, telephone/cable TV systems, roads and walks, street lighting, landscaping, and recreation facilities. As part of this action, a stormwater management pond has been constructed approximately 400 feet east of the new family housing complex (USAG, 2002c).

The DoD selected the Installation for the RCI, a public-private partnership program in which private development capital and expertise is combined with existing Army land, housing assets, and the income stream from military renters to quickly build additional housing or renovate existing housing without using appropriated tax dollars (USAG, 2002c). The existing 191 family housing units are to be conveyed to GMH Military Housing, LLC, along with a 50-year land lease of up to 117 acres through the RCI (USACOE, 2003). An additional 161 housing units under the RCI are planned for construction in CY 04 to provide a total of 354 housing units on the Installation (Bennett, 2003a; USACOE, 2003; Fort Detrick Standard, 2003). In addition to housing units, the RCI plan includes playgrounds, jogging paths, walkways, and possibly a new community center (Fort Detrick Standard, 2003).

4.12 NOISE

Fort Detrick is considered a relatively quiet environment with no significant noise pollution sources on the Installation. Minor sources of noise at Fort Detrick include the boiler plant, the generator facilities in Buildings 1673 and 1677, vehicular traffic, and the carpenter shop in Building 199. Surveys are conducted periodically to identify operations that expose workers to potentially harmful noise levels. Employees who work in areas with potentially harmful noise levels are enrolled in the Army's Hearing Conservation Program. The bugle and cannon are exercised at 5:00 p.m. Monday through Friday. Based on measurements of noise performed on the Installation, the noise generated from operations is compatible with residential use (USAG, 1998a).

4.13 ODORS

Odors sources at Fort Detrick include wastewater, contaminated laboratory materials, animal waste, bedding and carcasses, and infectious and medical wastes. Excluding wastewater, these waste materials must be rendered sterile through autoclaving (steam heating), chemical disinfection, and/or incineration prior to disposal. Transiently offensive odors may result from autoclave and incineration processes, however, they are typically localized in area and time and are rapidly dispersed in the ambient atmosphere. Steam sterilization processes at the NCI-Frederick Animal Production Area (Building 1021 – 1039 and 1044 – 1049), USAMRIID (Building 1425 and 1412), and the SSP (Building 375) may result in odorous emissions. Minor odors may also originate from the sewage treatment plant located in Area C of Fort Detrick (USAG, 1997a). No citizen complaints regarding unacceptable odors originating from Fort Detrick have occurred in many years. Previous complaints have been attributed to odors originating from the NCI-Frederick Animal Production Area and steps have been taken to remedy the situation (Covert, 1996).

In 1989, a full investigation into the likely cause of odors at the NCI-Frederick Animal Production Area, USAMRIID, and the SSP was conducted. The investigation determined that the odors emanating from these facilities were similar in composition and resulted from steam sterilization (Brinjac, Kambic, and Associates, 1989). During steam sterilization, the composition of some

protein-containing materials is altered by the high temperatures, resulting in odorous compounds (DA, 1991).

The most prevalent odors released from the NCI-Frederick Animal Production Area originate from the feeds sterilized by autoclaving feeds for use in germ-free animal colonies. The organic components of the feed produce odors when exposed to the high temperatures during steam autoclaving (Brinjac, Kambic, and Associates, 1989). In the summer of 1994, MDE received a complaint regarding an offensive odor in the vicinity of NCI-Frederick. Upon investigation, a representative of the MDE Air and Radiation Management Administration determined the odor in the area of NCI-Frederick to be “distinctive”. MDE was satisfied with NCI-Frederick’s plans and actions to reduce the offensive emissions.

Autoclaving is utilized at USAMRIID to sterilize potentially infectious microorganisms. The odors produced by USAMRIID are generated during the high temperature degradation of proteinaceous components and subsequent release into the atmosphere during the steam ejection purge of the autoclaving process. A renovation process combined all USAMRIID autoclaves into a single, central exhaust which substantially diluted the odors below thresholds (Brinjac, Kambic, and Associates, 1989).

Odors from the SSP result from effluent discharges to the sanitary sewer following high temperature sterilization. This sterilization process ensures the disinfection of effluents, particularly potentially infectious microorganisms, from biological research laboratories. The sterilized materials responsible for odor production are very similar in composition (i.e., denatured proteins) to odor components from NCI-Frederick and USAMRIID. Although some chemical compounds may also be released during the steam flash, the chemical odors are probably not a major contributing factor to emissions from the SSP facility. The installation of two potassium permanganate feed injection systems was recommended to curtail odors emanating from the SSP. USAG may decontaminate and abandon the LSS-SSP system. This system may be replaced by two new local wastewater treatment facilities to treat wastewater generated by USAMRIID and the USDA Building 374 greenhouse complex. If the two new treatment facilities are constructed, odors should decline due to increased efficiency and reduced volumes (USAG, 1997a).

Odor sources emanating from Fort Detrick originate from the boiler plant, the medical and municipal waste incinerators, the NCI-Frederick, and routine operations conducted at the Installation. The operation of the Fort Detrick boiler plant creates odorous by-products. The boiler plant is used for process steam production and comfort heating purposes. The boiler burns natural gas as a primary fuel and #6 fuel oil as a backup fuel (20 percent) during normal operations. However, in the past two years, natural gas has tripled in price, which has led to an increase in use of #6 fuel oil to as much as 60-70 percent. Since gas is currently priced at $6.30/ MMBTU and the current price of #6 fuel oil is $0.48/gal, gas prices would have to be around $3.00/MMBTU to be cost effective for use. If natural gas prices decline, use of #6 fuel oil will return to 20 percent (Spears, 2003; Warner, 2003).

The two municipal waste incinerators are equipped with emission control equipment and two medical waste incinerators at Fort Detrick are equipped with state-of-the-art emission control equipment. These incinerators are used to reduce the municipal waste load disposed of in the Fort Detrick Landfill and also generate an additional steam source, which reduces the load on the boiler plant. Stack emission odors from the two municipal waste incinerators, the two medical waste incinerators, and the boiler plant have been rarely observed at ground level when thermal temperature inversions occur in damp environments associated with the early morning

hours. Although there are no current Federal or state requirements to conduct periodic stack tests of the municipal waste incinerators, stack emission tests have been conducted at least six times with favorable results (Wolf, 2002c). The incinerator plant has four operating stacks that meet all the requirements for stack height, which accounts for types of pollutants, surrounding structures, and the affected public. The State of Maryland requires Fort Detrick to provide annual emissions of TAPs for the entire post operations. Although there are different emission limits for medical and municipal waste incinerators, TAPs emitted at the Installation are significantly below Federal and state limits (Greenwood, 2001).

Although located on Fort Detrick but considered a separate entity from Fort Detrick operations, the NCI-Frederick is a large odor source at Fort Detrick (Wolf, 2002c). The odors develop from the sterilization of research animal feed in autoclaves; however, the emissions do not threaten human health according to the MDE (Greenwood, 2001).

Odors are produced during routine Installation operations. Petroleum odors occur during the transfer of fuel from the main delivery tank to smaller boiler plant tanks, which occurs as many as six times per day. Garbage odors arise during the transport of waste (Greenwood, 2001). Further, minor odors may also originate from the sewage treatment plant located in Area C of Fort Detrick (USAG, 1997a).

4.14 TRANSPORTATION

4.14.1 Access to Fort Detrick

Fort Detrick is located in the northwest portion of Frederick, Maryland, approximately 45 miles north of Washington, DC and 45 miles west-northwest of Baltimore. Fort Detrick can be reached via a number of interstate and U.S. highways including I-70, I-270, U.S. 40, and U.S. 15. Interstate 270 and other major roadways that converge in the City of Frederick provide convenient access to Washington, Baltimore, and other employment centers in the region. Local access to the Installation is via the surrounding roadway network of city streets, county roads, and state highways. U.S. 15 is a two-lane divided highway serving both regional and local commuter traffic in the city of Frederick. This highway, also known as the Frederick Bypass, is located approximately one-half mile south of Fort Detrick. Average 1998 daily traffic volumes ranged from 33,200 vpd for U.S. 340 to almost 94,000 vpd for the Frederick Bypass (Frederick County Department of Planning and Zoning, 2000). The Frederick Bypass interchanges with Rosemont Avenue, West Seventh Street, and Opossumtown Pike. Rosemont Avenue is a major artery serving north-south travel in Frederick and it forms the western boundary of Area A. West Seventh Street is a minor north-south artery, which serves as the primary access route to Area A of Fort Detrick. The eastern border of Area A is formed by Opossumtown Pike, which is a major north-south artery. Military Road, an east-west minor arterial, forms the southern boundary of Area A.

There are four access gates to the Installation: the Main Gate; the Rosemont Gate; the Opossumtown Gate; and the Old Farm Gate. All gates are guarded when open. The Main Gate is located at the “T” intersection of West Seventh Street and Military Road. This intersection is controlled by a stop light on the eastbound approach at Military Road, the southbound approach exiting the Installation, and northbound traffic entering Fort Detrick from West Seventh Street. Enacted on December 10, 2002, all non-decaled vehicles will enter through the entrance immediately to the right of the Main Gate on West Seventh Street, Monday through Friday, from 6:00 a.m. to 6:00 p.m. At all other times, non-decaled vehicles will enter through the Main Gate.

All northbound decaled vehicles will continue to enter through the two lanes at the Main Gate. Re-routing non-decaled vehicles to an alternate entry was enacted to decrease the amount of time vehicles wait on West Seventh Street when entering through the Main Gate while maintaining necessary security precautions (Fort Detrick, 2003). The Main Gate is open 24 hours a day.

The Rosemont Gate provided access to the Installation from the west. The Rosemont Gate is located just east of the intersection of Rosemont Avenue and Montevue Lane, which is controlled by a traffic signal. As of December 10, 2002, the Rosemount Gate is open for vehicles exiting the Installation between the hours of 3:00 p.m. and 6:00 p.m., Monday through Friday. The gate is closed all other hours.

The eastern gate to Area A, the Opossumtown Gate, is located at the intersection of Porter Street and Opossumtown Pike. Currently, the Opossumtown Gate is open for inbound traffic from 6:00 a.m. to 6:00 p.m., Monday through Friday. To relieve traffic congestion during lunch, and afternoon peak traffic hours, the Opossumtown Gate is open for vehicles exiting the Installation from 11:00 a.m. to 6:00 p.m. The Opossumtown Gate is closed on holidays.

The Old Farm Gate is located at the intersection of Rosemont Avenue and Old Farm Road (USAG, 1998a). All trucks entering the Installation must enter via this gate and be inspected. Vehicles can enter the Installation using Old Farm Gate from 6:00 a.m. to 6:00 p.m., Monday through Friday. Vehicles can exit the Installation through the Old Farm Gate from 6:00 a.m. to 6:30 p.m., Monday through Friday. The Old Farm Gate is also closed on holidays.

4.14.2 Vehicular Transportation

Vehicular transportation on Fort Detrick is available on primary, secondary, and tertiary roadways, which are controlled by signs, striping, and occasional direction by security personnel. Currently there are no traffic signals on the Installation. The primary roadways on Fort Detrick are Porter Street and Ditto Avenue. Porter Street runs east-west across the Installation with one lane of traffic in each direction. Secondary roadways on the Installation include Randall Street, Freedman Drive, and Nelson Street. Randall Street is a two-lane, north-south street intersecting with Porter Street approximately 900 ft. east of Ditto Avenue. This roadway is approximately 30 ft. wide with curb, gutter, and sidewalks on both sides. Randall Street serves USAMRIID between Porter Street and Sultan Drive at “T” intersections. Freedman Drive is a two-lane street that intersects with Porter Street at two “T” intersections. Freedman Drive serves the commissary. Nelson Street serves the 1110th Signal Battalion (USACOE, 1996a).

USAG and the USACOE-Baltimore District performed an Installation-wide transportation study to document and characterize traffic conditions and to develop recommendations to improve overall traffic in and around the Installation (STV Inc., 2003c). Six levels of service (LOS), ranging from A to F, with A representing the optimum operating conditions and F representing congestion, are defined to represent operating conditions. Because of recent growth throughout the area, six intersections are currently operating at an unacceptable LOS. The following locations operate at an unacceptable LOS:

- Rosemont Avenue and Montevue Lane: LOS F during the PM peak hour.
- Rosemont Avenue and Military Road/Baughmans Lane: LOS F during both the AM and PM peak hours.

- Rosemont Avenue and US 15 NB Ramps/Second Street: LOS E during the AM peak hour and LOS F during the PM peak hour.
- Seventh Street and US 15 SB Ramps/Biggs Avenue: the minor street (ramp movements) operates at LOS E during the AM peak hour and LOS F during the PM peak hour.
- Opossumtown Pike and US 15 SB Ramps: the minor street (ramp movements) operates at LOS F during both the AM and PM peak hours.
- Motter Avenue and US 15 NB Ramps/Pinewood Drive: LOS F during the AM peak hour and LOS E during the PM peak hour.

Because demand often exceeds capacity, congestion results on US 15 during the morning and afternoon peak. Delays and queuing are apparent along Rosemont Avenue and Seventh Street. Vehicles entering Fort Detrick share the same lane heading toward Fort Detrick on Seventh Street with vehicles not heading towards the Installation. High queuing and delays turning left along Seventh Street at the southbound US 15 ramps are common. The southbound ramps from US 15 develop morning queues develop on Opossumtown Pike due to peak activity at Thomas Johnson High School.

4.14.3 Existing Parking Conditions at Fort Detrick

The 2003 *Installation-Wide Transportation Study for Fort Detrick* indicated that there were approximately 4,722 parking spaces available on the Installation. Parking facilities on-Installation consist of larger lots near USAMRIID and the USAG Headquarters facilities, smaller lots in the southwestern areas of the Installation, and on-street parking throughout the Installation. The existing parking conditions are generally adequate to support the current needs of Fort Detrick, but some areas have localized inadequacies. According to the PMO, existing parking facilities are not adequate other than in the southwestern section of the Installation. Deficiencies relate mainly to the amount of on-street parking and a high proportion of small, irregular, and poorly defined lots (USACOE, 1996b, STV, Inc., 2003c). A reorganization of parking facilities on the Installation is underway (see Section 2.5.3).

4.14.4 Public Transportation

Fort Detrick is served by the east-west Blue Route of the Frederick Bus System (TRANSIT). The Blue Route provides hourly service between downtown Frederick and the Frederick Towne Mall. In the vicinity of Fort Detrick, the Blue Route has three stops that provide convenient access to Fort Detrick. One stop is at the Main Gate on Military Road, the second stop is at the intersection of Military Road and Rosemont Avenue, and the third stop is at the Old Farm Station Shopping Center at Old Farm Road west of the Old Farm Gate. The Blue Route also provides service to the Maryland Rail Commuter (MARC) transit station in downtown Frederick.

4.14.5 Railways

The City of Frederick has been recently connected to the MARC Brunswick Rail Line on December 17, 2001. Service from Frederick includes three trains into Union Station, just outside downtown in Washington, DC each morning and three returning in the evening. Trains head for Washington, DC on the Brunswick Line from Point of Rocks. The MARC lines also provide

service to Washington, DC, Baltimore, Maryland, and West Virginia. Major rail terminals are located in Washington, DC and Baltimore, Maryland. The Pennsylvania Central Railroad and the CSX Railroad system, which includes the Chesapeake and Ohio (C&O) Railroad and the Baltimore and Ohio (B&O) Railroad, provide rail freight service in Brunswick, Maryland and Harpers Ferry, West Virginia (USAG, 1998a).

4.14.6 Aviation

The helipad located in Area A southwest of Building 1520 and is used infrequently for emergency air evacuation of medical patients and for VIP visitors. The Frederick Municipal Airport is located approximately three miles east from Fort Detrick. The Hagerstown Municipal Airport provides limited commercial passenger and cargo air service and is located 36 miles to the northwest of Fort Detrick. The Baltimore-Washington International Airport, Dulles International Airport, and Reagan National Airport provide commercial airline service and are located approximately 54 miles to the east, 43 miles to the southeast, and 50 miles to the southeast, respectively, from the Frederick area (USAG, 1998a).

4.15 SECURITY

The Installation Commander determines the degree of security necessary to protect personnel, equipment and classified information and material at Fort Detrick. The Commander's determination is based on the recommendation of the PMO. It is the responsibility of the PMO to develop and implement the plans and policies to direct, control, and manage the police/law enforcement on the Installation. Fort Detrick maintains a "closed installation". A "closed installation" is an Army installation in which access is continuously controlled by perimeter barriers with guarded, limited entry points (Fort Detrick Public Affairs Office, 2003c).

There are five force protection conditions (FPCON) as defined in the *Installation Physical Security Plan* are, ranging from lowest to highest priority: FPCON NORMAL, FPCON ALPHA, FPCON BRAVO, FPCON CHARLIE and FPCON DELTA (Fort Detrick Public Affairs Office, 2003c). The FPCON NORMAL condition, the lowest level, is the routine security posture applied when there is no discernible terrorist activity. The FPCON ALPHA condition applies when an unpredictable threat of potential terrorist activity against the Installation and personnel exists. The next level, FPCON BRAVO, applies when a more predictable threat of terrorist activity exists. Under FPCON CHARLIE, an incident has occurred or intelligence has been obtained that suggests some form of terrorist action against Fort Detrick is imminent. FPCON DELTA, the highest level, applies to the immediate area where a terrorist attack has occurred or intelligence indicates that a terrorist action against a specific location or person is likely (Fort Detrick Public Affairs Office, 2003c).

FPCON declarations are made exclusively by the Installation Commander and may be changed at any time to any level. The *Installation Physical Security Plan* fully describes each of these conditions and provides the necessary procedures for employees and residents to follow during a specific FPCON designation. Further, Fort Detrick maintains an Installation Crisis Management Plan (ICMP), which describes procedures to maintain and/or restore discipline, law and order during special threat situations on the Installation. Signs indicating the current FPCON designation are posted at the gates of Fort Detrick. These signs are used to keep employees, residents, and visitors informed of the current security conditions on the Installation.

The *Installation Physical Security Plan* has been developed in accordance with AR 190-13. The plan describes the minimum security measures necessary to protect the Installation against espionage, sabotage, damage, theft, or improper influence and to prevent any unauthorized access to facilities, equipment, and documents. The plan calls for physical barriers to provide protection to the perimeter of the Installation. Physical barriers include a perimeter chain-link fence, gate operations, and clear zones (e.g., bollards, concrete walls, a 80 ft. clearance from outside the gates). Other security measures employed at Fort Detrick include protective lighting, Intrusion Detection Systems (IDSs), protective communications, key and lock control, and security forces. The security force at Fort Detrick is composed of DoD Police Officers and DoD Security Guards. The Fort Detrick security force has 33 officers, 11 of these are U.S. Deputy Marshals. Ideally, there is at least one Marshall on duty every shift. All DoD Police Officers are armed with 9-millimeter pistols. DoD Security Guards are not armed.

On September 11, 2001 a terrorist attack on the World Trade Center Buildings in New York City resulting in the FPCON condition elevating from ALPHA to CHARLIE. This designation represents a high-level of security for the Installation. Although no specific threat has been directed at Fort Detrick, the three gates to the Installation are guarded and non-decaled vehicle searches are conducted. Upgrades to the gatehouses and perimeter are being conducted as part of the Proposed Action. A truck inspection station is currently being designed to be located on approximately four acres of the northeastern section of the 22-acre parcel north of NCI-Frederick. All trucks will enter through Old Farm Gate and through this inspection station. The PMO will continue to monitor local, national, and international events.

Security precautions are recommended for all employees, residents and visitors of Fort Detrick. Suggested security measures include: be alert of suspicious activities and vehicles, be suspicious and inquisitive of strangers, secure all buildings not in regular use, carefully inspect all deliveries, and implement security measures for high risk personnel (Fort Detrick Public Affairs Office, 2003c). In addition, appointed personnel, who have access to plans for evacuating or sealing off buildings or areas, must be available at all times in the event an explosion or attack has occurred.

The Federal government regulates security at Fort Detrick. State and local government agencies do not have jurisdiction over security measures at Fort Detrick. However, the PMO coordinates with local, state, Federal, and other military organizations regarding security procedures. The PMO is responsible for security on the Installation as a whole, but tenants are responsible for their own internal security. For example, USAMRIID, NCI-Frederick, and the 1110th U.S. Army Signal Battalion have their own internal security programs which are guided by the PMO. Some facilities have been designated as restricted areas in accordance with AR 190-13. Access to these facilities must be controlled by the responsible activity.

4.16 ENERGY RESOURCES

The Allegheny Power Company provides electrical power via two 35 kilovolt (kV) power lines to the Installation, primarily from the Monocacy substation and secondarily from the Frederick substation. A new substation (the Old Farm 230-12.5kV) is currently being constructed in an easement adjoining the USDA complex in the north central portion of Area A. This substation will initially help to ease the electrical load on the surrounding Frederick community but if it is expanded in the future, it could also serve Fort Detrick. Past utility usage for Fort Detrick is provided in Appendix M.

The demand for electricity at the Installation is high due to the energy-intense nature of research activities conducted at Fort Detrick. The total electrical consumption for the entire post for FY 02 was 139,323,476 kW/hr (Spears, 2002b). Peak summer electrical usage at Fort Detrick has the potential to overload the substation located adjacent to Building 1434 (Health Clinic). This substation will be expanded to accommodate new construction projects in the immediate area. The capacity of this substation will be doubled. The size is estimated to be 10 Mega Volt Amperes (MVA), 34.5 Kilovolt (kV) to 4.15X12.47 kV.

The Frederick Gas Company furnishes natural gas to Fort Detrick. Natural gas consumption for the entire post in FY 02 was 565,512 thousand cubic feet (kcf). An annual average of 83 percent of the natural gas provided to the post is used by the boiler plant and the incinerators (Spears, 2002a).

A major energy consumer at Fort Detrick is the central heating plant, which consists of five boilers, a steam sterilization plant, and a steam distribution system. The central heating plant utilizes both natural gas and #6 fuel oil to generate steam, which is used for heating and as process steam. Approximately, 70 percent of all steam generated at the boiler plant is process steam, which is used in the SSP and the laboratories for sterilization and humidification (USAG, 1998a). Steam is distributed throughout the Installation via an extensive network of overhead and underground steam lines. The steam pressure leaving the plant is 100-115 lbs per square inch gauge (psig). The total amount of steam used for the entire post in FY 02 was 558,652,000 pounds (Spears, 2002b).

4.17 MUNICIPAL SOLID WASTE

4.17.1 Fort Detrick Incinerator Complex

The Incinerator Complex consists of two municipal waste incinerators (B-1 and B-4) and two medical waste incinerators (B-5 and B-6). The municipal waste incinerator units were installed in 1975, and in 1995 the facility was expanded by 5,000 sf. to accommodate the medical waste incinerators. Fort Detrick is permitted to operate the municipal waste incinerators under MDE Permit No. 2000-WIN-0341 and the medical waste incinerator Permit No. 10-000131. Residential, mixed residential and commercial, commercial, and special medical waste are all types of waste that are permitted for incineration at Fort Detrick. These incinerators have the capability to safely incinerate and decontaminate infectious materials generated from the Installation's research activities. The incinerators can only accept municipal and medical waste from Fort Detrick. Each of the two municipal waste incinerators have the capacity to burn 2,000 lb/hr and each of the medical waste incinerators are able to burn 1,000 lb/hr. The incinerators can burn over 14,000 tons of waste per year; however, they are currently operating at 21% capacity (Wolf, 2002b).

Two incinerators with one ton per hour capacity each are used for municipal waste. The Incinerator Complex is permitted to incinerate residential and commercial type wastes. The municipal waste consists of approximately 40% animal bedding, 10-15% plastics, 30% office waste, and 5-10% wood waste. NCI-Frederick is the main contributor of municipal waste. It contributes 65% of Fort Detrick's municipal waste (Dressler, 2002a). In 2001, 2,273 tons of municipal waste was incinerated at Fort Detrick.

All medical waste is bagged and subsequently incinerated in the Special Medical Waste Incinerators, which are operated under MDE Air Management Administration Temporary Permit(s) to Operate No. 10-000131-2-0066 and No. 10-000131-2-0067. Fort Detrick submitted an application for a Title V Permit to Operate in July 1997. MDE provided a "pre-draft" permit for review in August 2003 (Wolf, 2003c). Ash from the incinerators is sampled and test results are submitted to MDE. A free liquids test is performed on a quarterly basis, and a Toxicity Characteristic Leaching Procedure is conducted semi-annually (USAG, 1998a; Wolf, 2003c). Medical waste is regulated by Federal, state, and local regulations to protect transporters and the public from potential hazards associated with potential contaminants. Medical waste at Fort Detrick is incinerated in accordance with CDC/NIH guidelines (CDC/NIH, 1999).

The capacity of the two medical waste incinerators is 1,000 lb/hr. On average, 2 tons per day are incinerated. Medical waste cannot be stored for more than 24 hours. The incinerators are operated 8 hours a day, 5 days a week, although the capacity to operate 24 hours a day exists. Both incinerators may be operated at the same time, although typically one incinerator is operating while the other is down for routine maintenance (Dressler, 2002a).

In September through October 2001, Federal postal facilities and government offices in the Washington DC area received mail contaminated with *Bacillus anthracis* (anthrax) bacteria and/or spores. Emergency measures to contain contamination of Federal postal and government facilities resulted in the collection of materials potentially contaminated with Anthrax. In an effort to safely dispose of the collected materials to protect public health and safety, the USEPA requested the MDE's permission to allow Fort Detrick to accept and incinerate the wastes being generated by the Washington D.C anthrax emergency clean-up (MDE, 2001). MDE determined that Fort Detrick's Incinerator Complex constituted the "most modern, safest, and most secure option for disposing of these materials in the area"(MDE, 2002d). On November 15, 2001, MDE authorized a Consent Order allowing Fort Detrick to accept these materials generated from the decontamination of Federal facilities provided that each facility sending waste there submit a plan for packaging and transporting waste to the facility. This Consent Order (MDE # CO-02-SW-033) was effective for ninety days. A supplement to the order was then added extending the order to no later than August 30, 2002 (MDE, 2002d). The wastes generated generally consist of decontamination water, decontaminated personal protective equipment (PPE), and decontaminated debris. The possibly contaminated materials were double-sealed in certified medical waste bags, and double-packaged in plastic transportation containers. The containers were transported by licensed Special Medical Waste haulers to Fort Detrick. Upon arrival, the material was unloaded and incinerated by Fort Detrick staff (MDE, 2002d). The decontamination water was conveyed to the SSP for treatment.

In August of 2002 there was a fire in the scrubber system due to an equipment failure. This unit was taken out of commission so that the system could be repaired. This incident did not impede incineration of waste because of an ongoing installation of a waste heat boiler on the same unit, which caused the unit to be out of commission (Dressler, 2002b).

Municipal waste incineration was halted from August-November due to the emergency water restrictions imposed on the base caused by drought conditions. All of the non-hazardous waste collected on the post was transported to the Fort Detrick landfill without going through incineration. These restrictions did not apply to the medical waste incinerators and all medical, institutional and special wastes were incinerated and disposed of in the Fort Detrick Landfill as usual (Dressler, 2002b).

4.17.2 Fort Detrick Municipal Landfill

The Fort Detrick Municipal Landfill, located in Area B, is permitted to operate by the State of Maryland under Refuse Disposal Permit Number 2000-WMF-0327-0. The permit was issued on 5 May 2000 and expires on 4 May 2005. The permitted area consists of a 60.9-acre fill area within Area B. This landfill may only accept waste generated at Fort Detrick. The types of wastes permitted include domestic, municipal, commercial, industrial, agricultural, silvicultural, construction, and other community sources. Types of waste that are not permitted for disposal at the Fort Detrick Municipal Landfill include: controlled hazardous substances, liquid waste, special medical waste, radioactive materials, automobiles, large containers such as drums or tanks (unless flattened or crushed and empty of contents), animal carcasses, untreated sewage, truckloads of separately collected yard waste and tires, unless otherwise specifically authorized by a valid permit issued under COMAR. Each category of refuse is collected at the Installation after it has been segregated and placed in separate containers for (non-hazardous) burnable, non-burnable, recyclable, medical, and pathological characteristics.

The landfill is constructed in compliance with the issued permit with compacted cell floors, synthetic geomembrane liners, and a leachate collection system. Groundwater monitoring wells are installed for leak detection and the leachate collection system routes leachate to the sanitary sewer system. A cover of six inches of compacted earth is placed over exposed solid waste daily to prevent odor and particulate emissions, and to minimize infiltration of rainwater into active cells. Intermediate and final covers over completed lifts are installed to depths of one-foot and two-feet, respectively. The disposal site is graded to minimize runoff, prevent erosion and ponding, and to drain surface water from the landfill area (MDE, 2000b, USAG, 1998a).

At the end of calendar year 2001, the remaining landfill capacity reported to the MDE was 1,380,218 cubic yards (cu. yd.). From CY 1997-2001 the Fort Detrick Municipal Landfill accepted 23,911 cu. yd. of material. The estimated average annual rate of waste disposal based on this five-year average is approximately 4,782 cu. yd., which includes refuse, fill, and cover material (see Table 4-10). Using this rate as an indication of future activity the Fort Detrick Municipal Landfill active cell has 155,549 cu. yd. of remaining capacity and will reach its maximum permitted load in 2093. The entire landfill has approximately 288 years left before it will reach its permitted capacity (Dressler, 2002b).

A variety of materials at Fort Detrick are recycled. Recycled materials include newspaper, white paper, cardboard, glass, aluminum cans, steel cans, and various scrap metals (see Table 4-11). Excluding computer cards and scrap metal, personnel manage the collection and sale of all the recyclables. Computer cards and scrap metal are shipped to the Defense Reutilization and Marketing Service (DRMS) service at the Letterkenny Army Depot for recycling. Due to the closure of this DRMS facility, Fort Detrick will be assigned a new DRMS in the future. Other DRMS facilities are located in Mechanicsburg, Pennsylvania and Fort Meade, Maryland (USACOE, 1997a).

Waste oil is also recycled at Fort Detrick. A contract recycling firm collects the waste oil from various points on the Installation (USACOE, 1997a).

In conformance with the permit to operate the Fort Detrick Municipal Landfill, a leachate collection system has been installed to collect waste liquids for treatment at the Fort Detrick WWTP. Leachate volumes and local rainfall amounts are reported monthly to the Solid Waste Division of the MDE. Leachate consists predominantly of groundwater that has percolated

Table 4-10. Fort Detrick Refuse Disposal (On-site) During 2000, 2001, and 2002.

Year	Non-Burnable[1] (lb)	Burnable[2] (lb)	Construction and Demolition[3] (lb)	Recyclable[4] (lb)	Bedding[5] (lb)	Year Total
2000	96,000	5,947,707	1,050	1,692,576	81,600	7,818,933
2001	45,600	6,093,615	29,700	1,970,268	105,200	8,244,383
2002	5,950	5,388,418	0	1,980,624	180,400	8,603,723

Source: Dressler, 2003.
[1]Disposed of in Fort Detrick landfill
[2]Incinerated
[3]Recycled
[4]Disposed of off-site
[5]Bedding values refer to bedding that was not incinerated and was deposited in the landfill

Table 4-11. Material Recycled at Fort Detrick in 2002.

Recycling Category	Recycled Material	Weight (Tons)
Metals	Mixed Metals	388
	Aluminum Cans	1.4
	Tin/Steel Cans	0
	Aluminum Foil	0.39
	Lead	0.12
	Copper	1.36
	Stainless Steel	0.40
Plastic	#1 and #2	6.53
Glass	Green Glass	8.31
	Brown Glass	6.14
	Clear Glass	3.21
Paper	Newspaper	40.12
	Old Corrugated Cardboard	290.08
	Office/Computer	95.18
	Mixed Paper	75.42
	Box Cuts	0
Other Material	Pallets	41.28
	Textiles	3.72
	Florescent Light Tubes	3.21
	Anti-freeze	1.42
	Used Motor Oil	8.59
	Tires	1.08
	Auto Batteries	13.83
Total (Tons)		**990.31**

Source: Dressler, 2003.

through the landfill cover. All collected landfill leachate is routed to the Fort Detrick WWTP. The landfill leachate was tested monthly from June 2000 to April 2002 for volatile organic compounds (VOCs) and the semi-volatile organic compound, bis (2-ethylhexyl) phthalate. The monthly testing schedule was revised to quarterly testing based on non-detects for all results from July 2001 through April 2002. The most recent analysis shows non-detect results for all VOCs tested and bis (2-ethylhexyl) phthalate (GCI Environmental Services, 2002).

4.18 HAZARDOUS MATERIAL MANAGEMENT

The Superfund Amendments and Reauthorization Act (SARA) establishes the reporting requirements for the storage of hazardous materials. SARA requires that the owner or operator of any facility that stores hazardous materials in reportable quantities must provide a list of all hazardous materials stored and the corresponding quantities and Material Safety Data Sheets (MSDSs) to the appropriate state and local emergency response planning committees and the local fire department. Five chemicals are stored in USEPA reportable quantities on the Installation, aluminum sulfate, nitrogen, sulfuric acid, sulfur dioxide, and chlorine. Aluminum sulfate is stored at the WTP (Building 1132). Nitrogen is stored at the SSP (Building 375) and USAMRIID (Building 1425). Sulfuric acid is stored at the Boiler Plant (Building 190) and sulfur dioxide is stored at the WWTP (Building 1110). Chlorine is stored at the WTP and the WWTP (Building 1110).

Tenants and organizations at Fort Detrick are responsible for obtaining their own hazardous materials. Individual tenants obtain hazardous materials from private manufacturers for shipment directly to their facilities. Hazardous materials are then stored in or near the users' laboratories typically in cabinets, refrigerators, or freezers. In addition to agency-specific Standard Operating Procedures (SOPs), all tenants must comply with the requirements of Federal, state, local, and DA regulations with regard to the procurement, use, storage, and disposal of hazardous materials. FD REG 200-3 and Fort Detrick Pamphlet (FD PAM) 200-3a provide procedures and guidelines for the management of hazardous materials.

The Hazardous Material Management Office (HMMO) is in the process of implementing an inventory program and a centralized database for all tenant purchases, storage, and use of hazardous chemicals. Currently, the individual tenants of Fort Detrick control the procurement of hazardous materials, however, this process will be controlled in the near future through a centralized database. This program will restrict the end user's inventory of hazardous materials, reduce consumption, and incorporate shelf-life management techniques. According to FD PAM 200-3a, the program will also ensure that all excess materials are turned in to HMMO for posting or ultimate disposal. Source substitution and process review teams will examine the current and future needs and protocols for opportunities to use less hazardous alternatives. These teams will also strive to reduce hazardous materials use in general, and investigate options for re-using spent hazardous materials (SHMs). MSDSs that accompany an order will be available for all chemicals used at Fort Detrick. For tracking purposes, the chemical name, Chemical Abstract Service (CAS) registry number, quantity ordered, National Stock Number (NSN) and user information will be provided to the HMMO on a real time basis to be incorporated into the centralized database for all hazardous materials ordered. The NCI-Frederick will not be included in this program because it is considered a separate entity from Fort Detrick. NCI-Frederick submits its own SARA reports for its operations. Fort Detrick and NCI-Frederick submit a copy of their Tier II Report to the Fort Detrick Fire Department as required by EPA regulations (see Table 4-12 and Table 4-13).

Fort Detrick tenants adhere to FD REG 200-3, which assigns responsibilities for the proper management of hazardous materials at Fort Detrick. AR 200-1, *Environmental Protection and Enhancement*, provides guidance for the identification and management of hazardous materials at DA facilities. The Hazardous Material Management Program (HMMP) for Fort Detrick is described in FD PAM 200-3a. According to FD REG 200-3, the Installation Commander

Table 4-12. Fort Detrick 2002 Tier II Summary.

Chemical	CAS Number	Average Daily Amount (lbs)	Maximum Daily Amount (lbs)
Aluminum Sulfate	10043-01-3	<100	<10,000
Nitrogen	7727-37-9	<10,000	<100,000,000
Sulfuric Acid	7664-93-9	<100	<10,000
Sulfur Dioxide	7446-09-5	<100	<1,000
Chlorine	7782-50-5	<100	<10,000

Source: Fort Detrick 2002 Tier II Inventory Report .

Table 4-13. NCI-Frederick 2002 Tier II Summary.

Chemical	CAS Number	Average Daily Amount (lbs)	Maximum Daily Amount (lbs)
Nitrogen	7727-37-9	<1,000,000	<1,000,000
Carbon dioxide	124-38-9	<100,000	<1,000,000
Ethylene glycol	107-21-1	<100,000	<100,000
Propylene glycol	57-55-6	<100,000	<100,000
Methylene chloride	75-09-2	<100,000	<100,000
Number 2 diesel fuel	68334-30-5	<100,000	<100,000
Chloroform	67-66-3	<1,000	<10,000

Source: NCI-Frederick 2002 Tier II Inventory Report .

supervises the HMMP and is responsible for establishing procedures for the protection of human health and welfare, including the distribution of MSDSs for all hazardous chemicals. The HMMO is functionally responsible for the HMMP. This office directs the conservation of resources and the management of hazardous materials through techniques such as process substitution, material recovery, recycling, and re-use.

The Fort Detrick Fire Protection Division (FPD) provides fire prevention and protection services to the Installation, which includes responding to emergencies involving hazardous materials. In addition to three fire engines, the FPD maintains and operates a fully-equipped hazardous materials response unit. Ambulance service is provided by the City of Frederick. DIS also maintains equipment and materials to assist in the clean-up of hazardous material spills. In accordance with SARA, the FPD receives copies of all MSDSs for hazardous materials stored in

USEPA reportable quantities on the Installation and receives itemized lists of the hazardous materials stored in non-reportable quantities. FPD personnel and employees who manage or handle hazardous materials are trained in accordance with Federal, state, local, and DA regulations.

The Integrated Contingency Plan (ICP) is designed to consolidate several redundant plans (i.e., the Facility Response Plan [FRP], the Spill Prevention Control and Countermeasure Plan [SPCCP], and the Installation Spill Contingency Plan [ISCP]) into one comprehensive plan. The ICP provides simultaneous compliance with several regulations governing spill prevention and planning including the requirements of AR 200-1, AR 500-60, Oil Pollution Act (OPA), Clean Water Act (CWA), RCRA, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA), and MDE regulations. The ICP identifies all of the sites on the Installation where the potential exists for significant spills of hazardous material/waste or petroleum, oil, or lubricants (POL), and establishes a spill prevention program for each of those sites. The identified sites include underground storage tanks (USTs), aboveground storage tanks (ASTs), hazardous material storage areas, pesticide storage areas, and fueling facilities. The plan describes the procedures that will be implemented to identify, notify, and react to spill incidents involving hazardous material/waste or POL products (USAG, 2001c).

4.19 HAZARDOUS WASTE MANAGEMENT

Hazardous waste and SHM must be collected at designated Satellite Accumulation Points (SAPs) on the Installation. Disposal of hazardous waste and SHM must be performed in accordance with applicable Federal, state, local, and DA regulations. A SAP is a hazardous waste collection area where a generator may accumulate up to 55 gallons of hazardous waste or 1 quart of acutely hazardous waste (i.e., P-listed). SAPs are typically located near the point of generation and are under the control of the facility operator. All containers in a SAP must be clearly marked as “Hazardous Waste.” Labels must include the accumulation date and an appropriate description of the contents The accumulation date is the date that the waste leaves the SAP, which simultaneously starts the 90-day time period that hazardous waste may be stored in a temporary storage area. Additional requirements for the operation of SAPs are provided in FD PAM 200-3b. Hazardous waste containers are transported by HMMO from a SAP to an approved temporary storage area.

Overall the types and quantities of hazardous waste generated at Fort Detrick can vary considerably from year to year (see Table 4-14). The biomedical research laboratories and maintenance department are the major sources of hazardous waste. Laboratory research activities typically generate small quantities of many different types of hazardous waste. Other activities with more predictable waste streams usually generate large quantities of hazardous waste. In 2001, Fort Detrick generated 23,655 lbs of hazardous waste (Leadore, 2003a). Of this total, 52 percent was toxic waste, 32 percent was MD (Maryland) toxic waste, 7 percent was toxic and ignitable waste, 6 percent was ignitable waste, and < 1 percent was corrosive waste. A list of Fort Detrick hazardous waste generators and their annual hazardous waste generation for 2001 is provided in Table 4-15.

Area A and Area B operate under USEPA Hazardous Waste Generator Nos. MD8211620267 and MD4211600958, respectively. NCI-Frederick’s Hazardous Waste Generator Number is MD 3750832062. Although USAG provides NCI-Frederick with many services and utilities, NCI-Frederick is not supported by the Installation Hazardous Waste Management Program (HWMP).

Therefore, NCI-Frederick operates under its own USEPA hazardous waste generator identification number, maintains its SAPs and 90-day temporary storage areas, and arranges for its own hazardous waste disposal contractor.

Table 4-14. 1998 - 2002. RCRA Annual Hazardous Waste Quantities.

Year	Annual Hazardous Waste Area A (lb)	Annual Hazardous Waste Area B (lb)	WTP
1998	33,383	88	-
1999	28,421	17,500[1]	-
2000	47,384[2]	2,019[3]	-
2001	23,655	227,040[4]	25,433[5]
2002	23,083	3,258,248[6]	-

[1] TCE contaminated groundwater from drilling operations.
[2] 28,777 lbs of total was from Cogenics re-lamping project sponsored by DIS.
[3] TCE contaminated well construction debris.
[4] Lead contaminated soil from skeet range demolition and closure.
[5] One-time removal of the expired fluoride additive from the water treatment plant.
[6] Trench B-11, pit 1 remediation project.

Source: Leadore, 2003a.

The generation, treatment, storage, transport, and disposal of hazardous waste at DA facilities are regulated by Federal, state, local, and DA regulations. AR 200-1 directs DA facilities to avoid, reduce, or eliminate the generation of hazardous waste. This can be achieved through the use of BMPs, improved procurement practices, and inventory control. In accordance with AR 200-1, installation HWMPs are designed to reduce the risk to human health and the environment by minimizing the generation of hazardous waste, developing cost-effective waste management strategies, reducing energy consumption, and conserving natural resources. By

Table 4-15. 2001 RCRA Hazardous Waste Quantities Generated by Activity.

Customer Number	Activity	Waste (lb)
1232V3	USDA	96
W23J51	USAG	18,427[1]
W23LMT	U.S. Army Space Command	65
W23MWK	USACEHR	61
W23MYC	USAMRIID	2,759
W23QEP	DIS Shops	2,058
W806YH	USAMMDA	189

[1] Hazardous Waste from the remainder of USAG.

Source: Leadore, 2003a.

2005, the goal of the DA is to reduce the disposal of hazardous waste by 30% from the 1999 baseline (USAG, 2001d).

Emphasis is also placed on pollution prevention, chain of command, and compliance with applicable regulations. AR 200-1 also directs DA facilities to design and operate temporary

storage areas and transfer facilities to prevent any releases to the environment. DA facilities are also required to maintain an inventory of hazardous waste that is generated, treated, stored, disposed of, or transported off-site.

Tenants must maintain their own procedures for managing and handling hazardous waste, and characterize their waste to determine the appropriate method of disposal. All waste that is identified as hazardous, including SHM and excess hazardous materials, must be properly labeled, packaged, stored, collected, and transported per RCRA, U.S. Department of Transportation (USDOT) regulations and the Fort Detrick HWMP. Tenants must also assign a point of contact (POC) to be responsible for the turn-in of these items to HMMO. Tenants are responsible for the expenses associated with the disposal of hazardous waste generated by their activities. Further, all individuals that handle or manage hazardous waste at Fort Detrick must be trained in accordance with 40 CFR264.16/265.16, 29 CFR 1910.120, and FD REG 200-4.

In accordance with FD PAM 200-3b*, Hazardous Waste Management Plan and Procedures*, all hazardous waste that is generated on the Installation is collected by the generating tenant in SAPs. A SAP is a hazardous waste collection area where a generator may accumulate up to 55 gallons of hazardous waste or 1 quart of acutely hazardous waste (i.e., P-listed). SAPs are located at the point of generation and are under the control of the facility operator. All containers in a SAP must be clearly marked as “Hazardous Waste” or with the contents of the container and the accumulation date. Additional requirements for the operation of SAPs are provided in FD PAM 200-3b. Hazardous waste containers are transported by HMMO from a SAP to an approved temporary storage area within 72 hours of reaching the 55-gallon hazardous waste limit or the 1-quart acutely hazardous waste limit.

A temporary storage area is a location where hazardous waste is stored for up to 90 days after it leaves a SAP. Requirements for temporary storage areas include secondary containment, chemical resistant and seamless floors, emergency equipment (e.g., phone, PPE, shower, fire extinguisher), and appropriate warnings and signs indicating the potential hazards associated with the facility. Once wastes are received at a temporary storage area, they are separated according to their USEPA hazard classification (i.e., ignitable, corrosive, toxic, and/or reactive). Additional specifications for temporary storage areas are listed in FD PAM 200-3b 8.

4.20 MEDICAL WASTE

In general, medical waste includes human and animal blood, cultures and stocks of infectious agents, syringes, needles, and animal bedding. The major generators of medical waste at Fort Detrick are NCI-Frederick (the largest), USAMRIID, and USDA. In FY 2002, the Installation incinerated a total of 2,045,416 lbs of medical waste (see Table 4-16).

Tenants and organizations must segregate waste into general solid, hazardous, radiological, and medical waste. Medical waste is collected in 4-millimeter thick, waterproof, tear resistant, nonchlorinated, red plastic bags, and most medical waste is autoclaved or chemically disinfected before leaving the generating facility. Contaminated sharps (needles, scalpels, glass) are handled separately and are stored in combustible, impenetrable, and puncture resistant containers. Medical waste that has been autoclaved is placed in a cart and transported

Table 4-16. Total Medical Waste Incinerated.

Year	Pounds
2000	1,393,552
2001	1,432,277
2002	2,045,416

Source: Dressler 2002b.

to Building 393 (the Incinerator Complex) by DIS. DIS collects all medical wastes. Special medical wastes are defined as wastes composed of human and animal body parts, tissues and organs (pathological waste); human and animal blood or materials soiled with blood; feces having a disease that may be transmitted to another human being or materials soiled with contaminated feces; materials that have come in contact with or contain a known infectious agent (including cultures and stocks of infectious agents); and syringes, needles, and other sharps (MDE, 2000b). All infectious medical waste is required to be properly packaged for transportation to the disposal site. If a problem is identified (e.g., sharps in a bag, bags not in carts, bags not autoclaved), the appropriate supervisor must be notified immediately and in turn will contact the Installation Safety Officer in charge of the problem site. Subsequently, the supervisor and the Safety Officer will ensure that the problem does not reoccur (Directorate of Engineering and Housing [DEH], 1993). DIS also attempts to identify any improperly handled waste to prevent improper disposal. All medical wastes are delivered to the incinerator and inspected to ensure that they are properly packaged, sealed, identified and labeled, and weighed prior to incineration. All medical wastes from ABSL-3/BSL-3 and ABSL-4/BSL-4 must be decontaminated on-site (at the laboratory level) prior to incineration. Any controlled hazardous substances found in medical waste are segregated and arrangements are made for transport of the substance to a permitted facility. The Solid Waste Program of MDE is notified within 1 hour of such an incident and a written report is submitted to MDE within 48 hours (MDE, 2000b).

Employees of facilities that generate medical waste must be trained in the safe handling of infectious agents, associated equipment, and proper disposal procedures for medical waste. SOPs have been established to support and comply with the *Exposure Control Plan for the Occupational Exposure to Bloodborne Pathogens* (29 CFR 1910.1030). These policies and procedures are applicable to all DIS personnel of the Refuse Collection and Disposal Section who come into contact with blood or other potentially infectious medical wastes. All DIS personnel receive initial and annual training, which includes instructions on personal protective clothing and equipment. All DIS refuse personnel are offered the Hepatitis B vaccine within 10 working days of their initial work assignment (DEH, 1993).

4.21 RADIOLOGICAL WASTE

Radiological waste generated at Fort Detrick includes aqueous wastes, dry solid wastes; biological waste contaminated with radioactive materials, waste scintillation fluid, and mixed wastes. Radiological waste is generated by four activities at Fort Detrick (USAG, USAMRIID, USDA, and NCI-Frederick), which are licensed by the NRC to use radioactive materials. Each generator/tenant is responsible for managing and disposing of all radiological waste that they produce. All radiological waste is shipped off-site for disposal through a subcontractor. The

exception is dry, solid radiological wastes generated by NCI-Frederick, which are housed on-site for decay and storage (Romagnoli, 2002).

Fort Detrick Regulation (FD REG) 385-3 establishes the requirements for proper packaging of radiological wastes for disposal by the generating activity. All radiological wastes must be segregated according to type. Radiation Waste Management, whose personnel supervise all packaging and processing activities, provides the majority of the packaging equipment. Dry, solid radiological wastes must be packaged in yellow, 30-gallon containers with the isotope and activity noted on the accompanying data sheet. The activity of a radioactive material refers to the number of nuclear transformations occurring in a given quantity of material per unit of time.

Bulk liquid wastes, which are high-volume and low-activity wastes, must be placed in 5-gallon plastic carboys with metal transport containers for disposal with the isotope and activity noted on the attached data sheet. Reagents, which are low-volume and high-activity wastes, are placed in plastic containers suitable for the volume of waste. The lid of the container must be wrapped in parafilm or tape and the name of the generator, isotope, and activity of the waste must be noted on the container. Lids on scintillation vials must be tightly closed prior to placement in shipping trays for disposal. Trays must be labeled “Caution-Radioactive Material” and handled with care to avoid breakage of the vials. The generator, isotope, and activity of the waste must also be noted on the trays.

Metals, dirt, and animal bedding contaminated with radioactive materials must be packaged separately in appropriate containers and labeled with the user, isotope, and activity. Contaminated animal carcasses and organs must be placed in individual bags and kept frozen until coordination with Radiation Waste Management. Needles and syringes contaminated with radioactive materials must be packaged in appropriate containers designed for sharps and labeled for disposal.

Until recently, all low-level radiological wastes were transported to Building 261, the 90-day TSA for radioactive waste, where wastes were processed, packaged, and stored prior to ultimate disposal (USAG, 2001c). This facility is currently being decommissioned through the NRC (Leadore, 2003a). Currently, radiological waste is sorted and disposed of by the tenants separately. The NCI, USAMRIID, Building 1301, and Building 262 are sorting locations (Leadore, 2003a). Radioactive material users are responsible for ensuring that all packaged radiological waste is maintained under constant control until it is shipped off-site. All radiological waste storage areas are considered “Restricted Areas” and therefore must be locked and labeled with appropriate warning signs (10 CFR 20.303).

Fort Detrick eliminated all discharges of liquid radiological waste into the sanitary sewer in December 1999. Once standards have been established for sewage sludge, Fort Detrick will develop new regulations and SOPs for the disposal of liquid radiological waste. Liquid wastes containing tritium and carbon-14 will be collected and disposed of commercially. All liquid radiological waste, except that containing tritium or carbon-14, will be held on-site for decay (approximately 2-3 years) and disposed of as ordinary wastewater.

4.22 PESTICIDES

4.22.1 Integrated Pest Management Approach

All pest management activities at Fort Detrick are implemented in accordance with the current Installation Pest Management Plan (IPMP) (USAG, 2003c). The IPMP outlines procedures for pest surveillance, non-chemical and chemical pest management techniques, as well as health and environmental safety procedures. Per AR 200-5, *Pest Management,* the IPMP is updated throughout the year and sent to the Pest Management Consultant (PMC) at the U.S. Army Environmental Center (USAEC) annually. The IPMP is submitted for a formal, full-document review every five years. The current Fort Detrick IPMP is approved through September 30, 2003 and is due for a full document review in March of 2005 (Bennett, 2003c).

The goal of the pest management program at Fort Detrick is to safeguard human health, as well as structures and aesthetic features on the Installation, while providing maximum protection to the local ecosystem and environment. To achieve this goal, the IPMP sets forth principles for an integrated pest management approach, which aims to significantly reduce the use of pesticides by applying non-chemical pest management techniques, including mechanical and physical, cultural, and biological control techniques, whenever possible (USAG, 2003c). Adherence to the integrated pest management approach, as outlined in the IPMP, also assures that Fort Detrick meets the terms of Merit 2 in DoD Instruction 4150.7, DoD Pest Management Program. Merit 2 calls for a 50% reduction in annual pesticide usage on DoD Installations by the end of FY 2000 (compared to FY 1993 levels).

Chemical control, the use of pesticides, is employed only when other pest control methods are ineffective or not practical. Pest management personnel or contractors at Fort Detrick only use USEPA or state approved pesticides as outlined in the IPMP (USAG, 2003c). A listing of IPMP approved pesticides (as of February 03) and their target pests can be found in Appendix N.

4.22.2 Pesticide Storage, Mixing, and Transportation

Pesticide storage and mixing facilities are constructed to meet standards as outlined in Military Handbook (MIL-HDBK) 1028/8A. Pesticides, materials, and equipment used in pest management operations are stored in Building 122. Pesticides are kept in flameproof safety cabinets in a climate-controlled room that features recessed, drain-less flooring for spill containment. Pesticides are clearly labeled and separated by pesticide class. To reduce storage requirements, pesticides are purchased on an as-needed basis and in small quantities that do not exceed a one-year supply (USAG, 2003c). A current (March 03) pesticide inventory for Building 122 can be found in Appendix O.

Mixing of pesticides also takes place in Building 122. The mixing room is equipped with a deluge shower, eye lavage, and pesticide spill kit. In addition, it is also outfitted with recessed spill-containment flooring, a backflow prevention protected sink, and an exhaust hood. An outside water source, which is used to fill large spray tanks, also possesses a backflow prevention device. The building is equipped with an industrial fire suppression system, and both the pesticide storage room and the mixing room contain a discrete ventilation system (USAG, 2003c).

Transportation of pesticides occurs in a designated pest management vehicle, which is equipped with lockable storage compartments, a portable eye lavage, a spill kit, and a fire extinguisher. Pesticides are secured in the storage compartments during travel and when the vehicle is unattended. At no time are pesticides or pesticide contaminated equipment transported in the cab of the vehicle. Pest management personnel complete all applicable DoD Hazardous Communication (HAZCOM) courses as well as a Department of Transportation (DOT) level VllB class on transport of regulated hazardous materials (USAG, 2003c).

4.22.3 Pesticide Application

The application of pesticides at Fort Detrick is carried out by trained and/or certified pest management personnel or by certified, licensed, outside contractors. All pesticides are applied per USEPA and state approved label directions, and pesticide applications are conducted in a manner aimed to eliminate risks to human health and to limit potential, negative impacts on the environment. To minimize spray drifts, outdoor applications of pesticides are only conducted at wind speeds below five miles per hour. Following applications, placards are placed to identify areas that received pesticide treatment (USAG, 2003c).

Pest management personnel maintain records of all pest management activities conducted on the Installation. In 2002, Fort Detrick applied 61 lbs of pesticides (Boyland, 2003a); an itemization of pesticide usage for 2002 can be found in Appendix L.

4.22.3.1 Occupational Health and Safety

Protective measures to ensure the health and safety of workers involved in pest management activities include training and medical monitoring of personnel as required by Federal and state laws and regulations. All Fort Detrick pest management personnel participate in medical screening and surveillance, health education, and respiratory protection programs, which are administered through the Fort Detrick Occupational Health Clinic. Pest management personnel are given thorough, annual, physical exams, to evaluate overall health and potential exposure to pesticides, especially cholinesterase inhibiting substances. In addition, personal protective equipment (PPE) must be worn during all pest management activities. PPE includes: approved respirators, chemical resistant gloves, aprons and boots; full face shields; splash goggles; and a work uniform or coveralls. Detailed instructions on proper use and handling of PPE, as well as disposal of pesticide contaminated PPE is provided in the IPMP (USAG, 2003c).

4.22.3.2 Pesticide Disposal and Spill Clean-up

To minimize pesticide waste and to limit disposal needs, pesticides are purchased in small quantities that can be used within a season. Per AR 200-5 (chap 2), all excess pesticides must be returned to the Defense Logistics Agency (DLA) Materials Return Program or to the Defense Reutilization and Marketing Office. Pesticide waste, contaminated equipment, and pesticide spill residues, which are classified as hazardous materials (HAZMAT), are disposed of in accordance with AR 200-1 (Chapters 3 and 5) and Armed Forces Pest Management Board (AFPMB) Technical Information Memoranda (TIM) No. 15 and No. 21. Non-HAZMAT pesticide materiel and pesticides are disposed of per the product's EPA approved label.

All accidental pesticide spill incidents are managed per procedures outlined in the Fort Detrick SPCCP, the Installation Spill Contingency Plan (ISCP), and the AFPMB TIM 15. In the event of a pesticide spill, personnel will notify proper authorities, provide first aid to injured workers, and

contain, clean, and decontaminate the spill area. Pesticide spill clean-up kits are maintained in Building 122 and on the pest management vehicle (USAG, 2003c).

4.23 FORT DETRICK ENVIRONMENTAL CONCERNS

4.23.1 Restoration Advisory Board

The Fort Detrick RAB was created in 1993 to communicate information regarding the environmental investigations and clean-up activities being conducted at Fort Detrick to the general public. The RAB is composed of members of the community and governmental representatives of DA, USEPA, and MDE. The RAB conducts regular meetings that are open to the public. In addition to facilitating the exchange of information between parties, this forum also provides the RAB with the opportunity to participate in the clean-up decision-making process and to review the progress of clean-up activities on the Installation (RAB, 2003).

4.23.2 Area A Environmental Concerns

Several sites on Area A have been identified as areas of potential environmental concern though the Fort Detrick RI, historical records, and geophysical investigations. These areas are the water tower sites; the Area A skeet range; the cleanfill and combustible burn pit sites; the south central Area A disposal site; the western Area A landfill; a possible medical waste landfill near Building 535; the LSS; Building 470; the TCE spill site near Building 568; the Building 190 oil plume; and the gasoline storage tank leaks (USACOE, 2000b, NCI-Frederick, 2003) (see Appendix P).

4.23.2.1 Water Tower Sites

There are three water tower sites located on Area A, designated south, north, and west. The soil surrounding the water towers is contaminated with lead. Fort Detrick has implemented land use restrictions under each tower to minimize lead exposure. According to the human health risk assessment performed for the water tower sites and included in the remedial investigation report, it was determined that lead concentrations near the water towers posed no significant risk to human health since residential properties are not located near these towers. No remedial action is required for these sites (USACOE, 2000b).

4.23.2.2 Area A Skeet Range

A possible recreational skeet range in the southeastern corner of Area A was identified in November 2002. The range was in operation from approximately the 1950s through the 1980s. The former skeet range was located at Building 1520 and extended like a fan out approximately 1,000 ft. southeast of Building 1520, north to Building 1434 (Barquist Health Clinic). Because lead contamination from firearm discharge in this area was a potential concern a soil remedial investigation was performed on this site in July 2003. Laboratory results showed lead levels to be between 31 to 104 milligrams per kilogram (mg/kg), which are slightly above background levels for that area (12 to 28 mg/kg). However, the levels were not higher than MDE residential and industrial risk-based concentration (RBC) levels of 400 mg/kg and 1,000 mg/kg. Therefore, no remediation of the area was deemed necessary. These slightly elevated lead levels may be attributed to the operation of the former skeet range in this area (Gortva, 2003b).

4.23.2.3 Cleanfill Area

Another area of concern is the Cleanfill Area, which is located in the southeastern portion of Area A and encompasses approximately 500,000 sf (11.5 acres). The estimated fill depth increases from east to west, less than 3 ft. to 6 ft., respectively. Minor sinkholes were observed east of the heliport and are ascribed to the fill. This area received construction material such as rock, soil, asphalt and concrete. No records of hazardous waste disposal in this area were found and the geophysical survey confirmed this observation (USACOE, 2000b).

A Phase I investigation incorporated a geophysical survey and soil investigation. Samples were collected to determine if soil contamination was present at the surface (depths 2 ft. below ground surface [bgs] or less) and subsurface (depths greater than 2 ft. bgs) of the landfill area. Both organics (VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs)), and inorganics (arsenic, barium, beryllium, calcium, copper, iron, lead, magnesium, mercury, nickel, potassium, and vanadium) were detected at low levels in the soil samples. Concentrations of VOCs, pesticides, and herbicides did not exceed USEPA Region III residential or industrial RBCs. Concentrations of a SVOC, benzo(a)pyrene, detected in two samples, and a PCB, Aroclor 1260, detected in one sample, exceeded residential RBCs. Arsenic was the only chemical detected that exceeded both maximum background levels and the USEPA Region III residential and industrial RBCs. The risk estimates for workers exposed to the detected chemicals were at the very low-end of USEPA's target risk range. Due to the low risk estimate no further action was taken (USACOE, 2000b).

Concern over a high level arsenic reading and a high level Pb reading from a soil boring located at the eastern edge of the cleanfill area (the new commissary site) prompted further investigation. In fall 2002 a laboratory retest of one soil boring was performed to determine if possibly a metal fragment from the fill material was included in the soil sample, which would misrepresent the area around the soil boring. The concentrations were still found to be above MDE and EPA standards, however, the background levels for arsenic in Frederick, including Fort Detrick occur naturally above residential and industrial RBCs. Area A has background levels of arsenic ranging from 5.31 milligram per kilogram (mg/kg) to 71 mg/kg. Thus, the elevated arsenic level found in the soil boring falls within the background range for Area A and no remediation is required (Gortva, 2002a; Schnabel Engineering Associates, Inc., 2002).

During the Installation restoration program, 26 soil samples were analyzed for metals and Pb levels in all of the samples were below the 400 mg/kg MDE and USEPA standard. The elevated Pb level found in this soil boring may be due to some Pb based paint chips that were included in the soil sample analysis (Gortva, 2002a). Fort Detrick is currently investigating this finding and will provide remediation for the area if deemed necessary (Sheffer, 2002b).

4.23.2.4 Combustible Burn Pit

The former combustible burn pit (150 ft. x 20 ft.) is located in the southeastern corner of Area A, approximately 500 ft. east of Building 1520 and approximately 140 ft. west of the A-3 outflow drain. The pit was used to burn scrap lumber and it was also assumed that a petroleum product was used to ignite the material. The area is presently grass covered and surface soil samples reveal no evidence of past burning activities (USACOE, 2000b).

A Phase I soil investigation of the combustible burn pit consisted of a surface geophysical survey. A Phase II soil investigation of the pit included three borings to determine if soil contamination was present at the surface (depths 2 ft. bgs or less) and subsurface (depths

greater than 2 ft. bgs) of the burn pit area. Both organics (VOCs, SVOCs, pesticides, and PCBs), and inorganics (arsenic, beryllium, copper, iron, lead, magnesium, mercury, and cyanide) were detected at low levels in the soil samples. Concentrations of VOCs, SVOCs, pesticides or PCBs did not exceed USEPA Region III residential RBCs. At 5-6 ft. bgs there was no burn evidence (debris or disturbed soil) indicating that past burning activities have not contaminated soils at this depth. Due to the low risk estimate, no further action was taken (USACOE, 2000b).

4.23.2.5 South Central Area A Disposal Site

A 2001 airborne geophysical survey of Fort Detrick revealed magnetic anomalies approximately 400 ft. northwest of Building 1434 (Health Clinic) and a visual reconnaissance in October 2002 uncovered a previously unknown disposal site at that location. Because power lines on the site obscured the airborne geophysical survey in this area, the presence of magnetic anomalies suggestive of buried materials at this site could not be precluded. In March 2003 an electromagnetic sweep of the property with a portable device concluded that no large buried electromagnetic anomalies were present (Shaw Environmental and Infrastructure, Inc., 2003).

A trenching investigation was completed in April 2003 for a 2-acre area north of the proposed IRF site. This investigation included the excavation of twelve 50-foot long, 4-foot deep trenches. Objects recovered in this study included metal pipes, rebar, and large quantities of limestone fill. Elevated levels of arsenic and iron were detected, however, these values were within the background levels of the area (Shaw Environmental and Infrastructure, Inc., 2003).

4.23.2.6 Western Area A Landfill

Historical records allude to possible landfill materials present to the south and east of Building 538. Landfill materials were encountered and documented during the construction of Chandler Road in 1952, and that this waste was possibly placed there prior to 1947 (USAG, 1977; USACOE, 2000b). The location of this landfill was not confirmed through geophysical surveys and wastes were not encountered during installation of several underground utility lines. All anomalies encountered were attributed to buried utilities, geological features (such as shallow bedrock), and interference from high magnetic fields areas surrounding Building 538 (USACOE, 2000b). Therefore, it was concluded in the *Fort Detrick Remedial Investigation Report Area A, Revised Final* that due to the minimal historical documentation and the lack of geophysical evidence it is believed that a buried landfill to the south and east of Building 538 does not exist (USACOE, 2000b).

4.23.2.7 Medical Waste Landfill Near Building 535

Another possible landfill on the NCI- Frederick Main Campus was discovered during excavation activities at the Building 535 site in 1992. An anecdotal report indicated that buried medical waste and laboratory equipment were discovered at this site. No historical records were discovered to account for the origin of the waste. However, there is no evidence to support this finding nor historical records to account for the origin of the waste (Ritter, 2003).

4.23.2.8 LSS

The LSS underlying Area A is of environmental concern because of the possible contamination from past biological warfare liquid wastes and radioactive materials. The LSS is discussed in detail in Section 4.5.4.

4.23.2.9 Building 470

Building 470 "Pilot Plant" was built in 1952 and utilized to culture biological agents such as anthrax for the U.S. offensive biological warfare program. In the early 1970s the facility was decommissioned and decontaminated (NCI/NIH, 2002). The building was unused and in 1985 it was cleaned again due to accumulated pigeon guano within the building. In 1988, Building 470 became DHHS property and was used as storage. In March 2000 an inspection of the building showed numerous structural deficiencies and environmental hazards (NCI/NIH, 2002). Several of the environmental hazards found within the building include: PCBs in the light ballasts, electrical transformers in the basement, and elevator equipment motor oil; asbestos in the pipe insulation; and peeling Pb wall paint (Versar, 2002). The accumulated pigeon guano could potentially cause exposure to *Cryptococcus* or *Histoplasma* through inhalation (NCI/NIH, 2002). Because this building was used for the production of anthrax a decontamination procedure was performed using formaldehyde gas. This building has been declared clean and does not pose a threat to workers, however, due to the nature of anthrax to adhere to porous surfaces, the building could never be declared 100 percent clean and so safety procedures such as respirators may be utilized as a precautionary measure (Covert, 2000; NCI/NIH, 2002).

The potential demolition of Building 470 was evaluated in *Building 470 Demolition Environmental Assessment* dated January 24, 2002 (NCI/NIH, 2002). That analysis concluded that no significant environmental impacts are associated with demolition of this building. However, because of its past use as a biological agent containment facility and building materials that contain PCB's, asbestos, and Pb, safety and health regulations will have to be strictly adhered to mitigate environmental consequences.

4.23.2.10 Building 568 TCE Spill

The Building 568 TCE spill site is located on the extreme southwestern portion of Area A. A demolition project for building 470 is currently underway (USACOE, 2000b). The groundwater gradient obtained for this TCE spill site during the remedial investigation indicated that groundwater flow is to the southwest in the location of the Building 568 spill site and with continuous remedial pumping activities at Building 568, contaminated groundwater is prevented from migrating. A decision document for long-term monitoring of the current pumping system was signed in 2001 (Gortva, 2003d).

4.23.2.11 Building 190 Oil Plume

Separate from the RI investigations at Area A, a fuel oil plume at Building 190 is currently being examined. Building 190 houses the Fort Detrick boiler plant, which commenced operation in the 1950s. The plant operates four boilers, two of which are fueled by natural gas and two by No. 6 fuel oil. A tank farm consisting of ten 53,000-gallon No. 6 fuel oil USTs was installed adjoining Building 190 between 1954 and 1956. In 1967, a 650,000-gallon No. 6 fuel oil AST was installed adjacent to the UST tank farm (USACOE, 2002c).

When the site of the tank farm was characterized to select the location for an additional 250,000-gallon No. 6 fuel oil AST in 1994, traces of No. 6 fuel oil were found in three out of four boreholes (USACOE, 2002c). The ten USTs were removed in early 1995, and according to the MDE records, several of them were leaking and free-phase petroleum product was observed floating on the water surface (MDE, 1999). Following this, groundwater monitoring was initiated to assess the extent of free phase No. 6 fuel oil in the aquifer, and a Corrective Action Plan (CAP) was established (USACOE, 1999b).

In addition, a fuel oil recovery system was installed near Building 190 to meet MDE clean-up requirements. The recovery well has yielded over 60 gallons of No. 6 fuel oil since March 2000 (USACOE, 2002c). Recommendations for future remedial actions at the former UST site include development of a conceptual site model and evaluation of corrective action alternatives based on the site model (USACOE, 2002c). The conceptual site model involves geologic and geophysical investigations, an approximation of hydrogeologic properties of the area, and long-term monitoring of groundwater. Much of this work has already been completed (USACOE, 2002d).

During the removal of the leaking UST's contaminated soil surrounding the tanks was also removed. Risks to site workers from the soil in this area are negligible, but full clean-up of the groundwater in the area of the fuel spill was impractical due to the nature of the Karst topography on Fort Detrick. Therefore, unacceptable risks to workers may exist if construction occurs that intersects the groundwater in this contaminated area (USACOE, 2000c).

4.23.2.12 Gasoline Storage Tank Leaks

On November 29, 1991 a 12,000-gallon gasoline UST was discovered to have leaked approximately 3,900 gallons of unleaded gasoline. This tank was located adjacent to Buildings 940 and 901. This tank was emptied on the day that the leak was discovered and in December of 1991 the tank was removed. Subsequently, ground-water monitoring wells were installed in Buildings 940 and 950 to assess the extent of ground-water contamination from the leak. Samples taken from some of the wells indicated low to high concentrations of gasoline fuel-related organic compounds (e.g., benzene, trichloroethene, chloroform). Benzene concentrations within the ground-water in the sampling wells were found to exceed the maximum contaminant level for drinking water (USACHPPM, 1998). MDE is working with Fort Detrick on this situation and any construction work occurring in this area will have to follow OSHA standards for worker safety. Furthermore, remediation will take place if deemed necessary by the MDE.

In April 1993, a leak of 400 gallons of gasoline was reported at the existing Fort Detrick service station (Building 950) and in June five, 8,000-gallon gasoline USTs were excavated. Several perforations in the tanks were noted as was contamination of the soil surrounding the tanks. Six monitoring wells were installed near Building 950. Samples from the wells in 1995 and in 1998 showed high concentrations gasoline fuel-related organic compounds (benzene, toluene, ethylbenzene, xylene, and MTBE). In 2001 USACHPPM made the following conclusions and recommendations for the site. The ground-water surrounding Building 950 is contaminated with residual organic compounds related to the 1993 gasoline leak. Although, the water-quality data indicates that natural attenuation is occurring and the concentrations have decreased from 1995 to 2001. Benzene concentrations in one of the monitoring wells exceeds the EPA's standards for drinking water. The recommendations for the site are to close down the monitoring wells since the site is capped with pavement and natural attenuation appears to be occurring. The data seems to suggest a low regional ground-water contamination risk. If the site is to remain open then a site-specific dye trace and long term ground-water level study must take place (USACHPPM, 2001b).

4.23.3 Area B Environmental Concerns

Area B of Fort Detrick contains 12 areas of environmental concern (Gortva, 2003d). These areas described below include: Area B outdoor simulant testing grid (B-Grid), ammunition

storage area (B-Ammo), Area B-skeet range, B-20 detonation areas, Area B-1 landfill, Area B-11 landfill, Area B-2 landfill, Area B-3 inactive landfill, Area B-6 landfill, Area B-8 landfill, Area B-10 and B-Grove landfills, and the Area B-18 landfill.

4.23.3.1 Area B Outdoor Simulant Testing Grid (B-Grid) (FTD 05)

The outdoor simulant testing grid was installed late 1940s to observe the dissemination of biological simulants (non-pathogenic microorganisms SM and *Bacillus globigii*). Agents were airdropped or dispersed as aerosols, with detonation of ordnance as a part of the test program. It is reported that limited outdoor testing of simulants may have begun as early as 1944. Residue of explosive containers/casings such as lead and mercury may have impacted the soil surface. Currently the site is used for pasture land for USAMRIID animal farm and leased grazing areas.

Surface and subsurface soil samples show: Arsenic levels are within background levels for the area and are not considered a result of a CERCLA release. Mercury levels are below RBCs for the area and therefore, no further investigation or remediation is required. Iron concentrations in Area B do not appear to be the result of a CERCLA release and therefore, no action based on iron is required. Based upon the data generated during the RI, Fort Detrick will prepare and submit a decision document to MDE recommending no further action at this site under the IRP/Defense Environmental Restoration Program (DERP).

4.23.3.2 Ammunition Storage Area (B-Ammo) (FTD 07)

Prior to 1971, munitions storage and loading facilities were present on the eastern portion of Area B. There were six subareas where munitions were stored in magazines and a munitions loading building. The storage facilities consisted of eleven above-ground magazines, one earth-covered magazine, and three smaller magazines. The materials were removed and the buildings decontaminated in the 1970s. All the magazines except Building 1215 were dismantled in 1971. The site is currently pasture and storage areas for USAMRIID animal farm.

Surface and subsurface soils samples were taken. After reviewing data generated during the RI, the Army, MDE, and EPA have determined that data gaps are present. The Army plans to collect additional RI/FS data. It is anticipated that these additional data will allow Fort Detrick to prepare and submit a decision document to MDE recommending no further action at this site under the IRP/DERP.

4.23.3.3 Area B-Skeet Range (FTD 29)

The skeet range is located in Area B and extends fan-like north of a point in the southwestern corner. It was used by military and civilian personnel as a recreational skeet range since 1950s. The range was deactivated in 1999. Surface and subsurface soil samples demonstrated elevated levels of lead. In 2001, the range surface area was scraped to remove a majority of the lead and clay pigeon contamination. Soils that did not meet TCLP levels for lead were removed as hazardous waste. The remaining soils were used at the Fort Detrick Municipal landfill as daily cover. Additional sampling will be conducted to define the extent of any remaining contamination and provide more accurate information for the RI. Based upon limited sampling performed during the removal, it is anticipated that no further remedial actions will be needed for this site.

4.23.3.4 B-20 Detonation Areas (FTD 43)

There are two explosive ordnance disposal areas located in Area B, one in the north and the second in the southwest area within the fan of the skeet range. Area B-20 north was used as a controlled burn area for the destruction of small amounts of explosives. The site is currently an open grass field. After reviewing data generated during the RI, the Army, MDE, and EPA has determined that data gaps are present. The Army plans to collect additional RI/FS data. It is anticipated that this additional data will allow Fort Detrick to prepare and submit a decision document to MDE recommending no further action at this site under the IRP/DERP. B-20 South was used as a control burn area for the destruction of small amounts of explosives. Surface and subsurface soil samples were taken. Pending determination of background metal concentrations, it is anticipated that no further remedial action will be needed for this site.

4.23.3.5 Area B-1 Landfill (FTD 48)

This 0.5-acre landfill is located in the northeastern portion of Area B. It was reported to have operated from 1948 to the mid 1970s receiving unknown quantities metals, wood, and general refuse from laboratory remodeling and building demolition. All material decontaminated prior to disposal. The site is currently part of Flair U.S. Army Reserve Center.

The disposal site was not found to exist in area identified by Pre-RI information. However, within the area originally defined as B-1, no further investigation is required. Based upon the data generated during the RI, Fort Detrick will prepare and submit to MDE a decision document recommending no further action at the area defined as B-1 under the IRP/DERP.

Fort Detrick will need to perform further field analysis and ground-truthing to determine if additional RI/FS work is needed in adjacent areas. Based upon discussions with the USAEC, a preliminary can be performed at a relocated disposal area and if needed a new Defense Environmental Restoration Account (DERA) site can be opened.

4.23.3.6 Area B-11 Landfill (FTD 49)

This landfill is part larger 19.6-acre landfill including sites FTD 69,70, and 71. It is located on the southwest side of Area B. This site is being investigated for soil and groundwater contamination.

B-11 received wastes from Fort Detrick, U.S. Bureau of Standards, and Walter Reed Army Medical Center. Materials disposed included: metals, wood and general waste from laboratory modifications and building demolitions, general housing refuse from Area A, excess laboratory chemicals, and general household refuse from the mid-1950s to the early 1970s, Trichlorethylene (TCE) and Perchloroethylene (PCE) drums, radiological materials including radioactive carbon, sulfur and phosphorus compounds. Groundwater monitoring shows detections of TCE and PCE leaving the post above MCLs. There is currently limited residential use of groundwater. Impacted residences were connected with Fort Detrick or Frederick municipal water supplies or offered bottled water.

A decision document was signed in FY 00 for the interim removal action (IRA) of one known and two suspected chemical waste pits thought to be the source of the TCE and PCE ground-water contamination. The IRA determined that there were four disposal pits with sizes much larger than anticipated. To date, Pit #1 has been removed and efforts to remove the remaining three pits are underway. In the Spring 2002, heat sealed vials containing live bacteria were discovered in the excavation. Some of the bacteria was identified as being human pathogens.

The IRA has had significant cost increases due to increased volume of waste and the discovery of live bacteria in heat sealed vials disposed with the research wastes. This resulted in significant changes to the project due to the additional disposal costs and changes to include biological testing and disinfection steps. The initial removal was projected to cost $4.9 million. The current removal estimate for all four pits is projected to be $25.9 million.

The remaining areas of the B-11 landfill will need further sampling and examination in to determine the future response. Intrusive investigations into the remaining landfill will be minimized due to the discovery of live pathogens in the B-11 IRA. It is anticipated no further removal actions will be needed for adjacent areas. Additional sampling will be conducted to provide more accurate information for the FS. A dye trace study and pilot groundwater treatability study (chemical oxidation using sodium permanganate or hydrogen peroxide) for groundwater are planned for the future, pending funding.

4.23.3.7 Area B-2 Landfill (FTD 50)

This 1.2-acre landfill is located in the north central portion of Area B. It operated between 1948 and the mid-1970s, receiving unknown quantities metals, wood, and general refuse from laboratory remodeling and building demolition. All material was decontaminated prior to disposal. The area is currently open grassland used for grazing.

After reviewing data generated during the RI, the Army, MDE, and EPA have determined that data gaps are present. The Army plans to collect additional RI/FS data in order to determine the future response. Intrusive investigations into this landfill will be minimized due to the discovery of live pathogens in the B-11 IRA.

4.23.3.8 Area B-3 Inactive Landfill (FTD 51)

This 5.0-acre landfill is located on the north side of Area B. The active portion of the landfill was not investigated as part of the RI. Seven or eight unlined landfills operated from the 1950s to 1990. They received metals, wood, general refuse from laboratory remodeling and building demolition, drums, herbicide and insecticide waste, and autoclaved animal carcasses. Laboratory glassware is also present. All materials were reported to have been decontaminated prior to disposal. The current site is partially open grassland with the remainder overlaying the current permitted active landfill.

After reviewing data generated during the RI, the Army, MDE, and EPA have determined that data gaps are present. The Army plans to collect additional RI/FS data in order to determine the future response. Intrusive investigations into this landfill will be minimized due to the discovery of live pathogens in the B-11 IRA.

4.23.3.9 Area B-6 Landfill (FTD 69)

This area is currently undeveloped grassland located in the southwestern corner of Area B. From 1948 until 1960 this area received construction material waste (e.g., metal, wood) and autoclaved carcasses of large and small animals. All animal carcasses used in biological agent research were routinely autoclaved and some were incinerated prior to burial. Possible contamination of this area could include ash, heavy metals, medical waste, and/or biological agents. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations into this landfill will be minimized due to the discovery of live pathogens in the B-11 IRA.

4.23.3.10 Area B-8 Landfill (FTD 70)

This site is currently undeveloped grassland located on the western side of Area B. From 1948 to 1972 this area received a variety of wastes including construction materials (e.g., wood, metal), general refuse, radiological materials, biological agent liquid waste and paint sludge from Building 375 and Building 384. After biological warfare work was ceased in 1969-1972, stringent decontamination of all holding tanks was completed. Testing indicated that inorganic material from the holding tanks in Building 375 was found to contain *Bacillus anthracis*. This material was thoroughly sterilized and repeatedly tested for anthrax growth after the sterilization procedure was complete. After demonstrating negative test results for anthrax growth, approximately 150 tons of sterilized liquid waste and decontaminated paint sludge was disposed of in the Area B-8 landfill. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations into this landfill will be minimized due to the discovery of live pathogens in the B-11 IRA.

4.23.3.11 Area B-10 and B-Grove Landfills (FTD 71)

This site is currently undeveloped grassland and forested area in the southwest portion of Area B. From 1965 to 1970 this area received general housing refuse and autoclaved and incinerated animal carcasses. The tree-covered area making up the B-Grove portion of this site was also reported to be a disposal area for unregulated household trash and miscellaneous debris, such as metal containers and laboratory glassware. Due to data gaps present for this site, further investigations for this area are planned. Intrusive investigations into this landfill will be minimized due to the discovery of live pathogens in the B-11 IRA.

4.23.3.12 Area B-18 Landfill (no official FTD site)

This area received a variety of waste up until 1950. The exact location of this landfill has not been determined, however, a ground-truthing survey of a tree area/sinkhole behind Area B-20 revealed surface debris and waste. This may prove to be the true location of this disposal area. A more thorough survey and investigation of this sinkhole area is planned.

4.23.4 Area C Environmental Concerns

Area C was acquired in 1944 and is exclusively used for industrial operations. It includes two small tracts covering 16 acres of land located along the west bank of the Monocacy River, east of Area A. One 7-acre parcel of Area C contains the WTP which serves the Fort Detrick population. The second parcel is a 9-acre tract of land one-quarter mile downstream from the WTP containing the Fort Detrick WWTP. Several areas of environmental concern have been in Area C, including the sludge stockpile area, sludge during beds, former ash disposal area, fill area, trickling filters, and soils contaminated with arsenic.

4.23.4.1 Former Sludge Stockpile Area

Sludge from the WWTP was stored directly on the ground prior to disposal during the period 1982 to 1988. PCBs and low-level beta radiation were detected in past sludge analyses. Currently the site is an open grass area with trees. No further action will be needed for this area.

4.23.4.2 Sludge Drying Beds

Eight sand beds used to dry sludge generated at WWTP. PCBs and low-level beta radiation detected in past sludge analyses. All eight sludge-drying beds are currently in use. No further action will be needed for this area.

4.23.4.3 Former Ash Disposal Area

An incinerator at the WWTP operated from 1944 to 1960s. The incinerator was demolished in 1975. Some ash from the incinerator was disposed on-site. Surface and subsurface samples taken in February 1999 indicated the presence of dioxins, furans, and arsenic. In 1992, the ash and the coincidental fill area were removed from the site and taken to Fort Detrick's permitted landfill. During the removal, potential debris from old incinerator was uncovered (metal beams and cinder block/bricks). This debris was not removed. No further action will be needed for this area.

4.23.4.4 Fill Area

A fill area was identified in the northern portion of the WWTP on a 1988 aerial photograph. This area was coincidental to ash disposal site. One surface and subsurface sample were collected in February 1999 and analyzed. Based on those results, no further action will be needed for this area.

4.23.4.5 Trickling Filters

The main rotating arm in the center of filter was fitted with mercury seals prior to 1982. The trickling filter distribution box was sampled for mercury in February 1999. Based upon results, no further action will be required.

4.23.4.6 Arsenic Levels in Soil

Soils in the Frederick area naturally contain elevated levels of arsenic. Preliminary data for Area C show arsenic levels above industrial and residential RBCs and above the upper range of background concentrations for arsenic. In addition, the measured levels show an unacceptable risk for unrestricted residential use when screened against risk-based concentrations. A Feasibility Study (FS), Proposed Plan (PP), and Decision Document (DD) will need to be completed to determine if the arsenic levels are naturally occurring, and if not, what clean-up actions would be required. It is anticipated that these studies will conclude that land use restrictions will result (maintain the property use for industrial purposes only).

4.23.5 Land Use Constraints

As discussed above in Sections 4.23.1 through 4.23.4, the environmental concerns for Area A, Area B, and Area C limit the type of development and land uses available for some parcels of Fort Detrick (see Figure 4-15). The current land use constraints are most restrictive for Area B and largely result from either on-going remediation activities or require further environmental investigation to determine potential use of the parcels (see Table 4-17).

Existing forestation and planned forestation of Area A and Area B will influence compatible land uses and activities. The forest stands found on both Areas A and B are planted groves of trees

with rows of pine, spruce, scarlet oak, red oak, and Siberian elm. One forest block is located on the western edge of Area A to the north of NCI-Frederick property. Another major forest block is situated on the northern side of Area A. The third forest block is located in the center of Area A. Other small stands of trees are located throughout Area A. A small riparian area is associated with wetland W-5 and is located downstream of the Nallin Farm Pond.

Water bodies and wetlands occur on both Area A and Area B and either prohibit development or restrict future development to compatible land uses (e.g., Nallin Farm area). Wetlands are afforded special protection under AR 200-2. Wetland area W-5 is the most productive wetland at Fort Detrick and is associated with the Nallin Farm Pond and its spillway. The three remaining wetland areas are located in Area B. Wetland areas W-2 and W-3 are associated with tributaries of Carroll Creek and are located in the riparian areas of Area B. Wetland area W-3 is located on the eastern edge of Area B and wetland area W-2 is located along the southern edge of Area B. Wetland area W-1 is located in the south-central portion of Area B.

The Nallin Farm House (Building 1652), the Bank Barn (Building 1655), the springhouse (Building 1661), and the One-million Liter Test Sphere (Building 527) are the four properties on Fort Detrick which are listed in the NRHP. The first three structures are located in the northeast corner of Area A and are collectively referred to as the Nallin Farm Complex. These structures are listed in the NRHP (see Section 4.9.2). The One-million Liter Test Sphere is located on the eastern edge of NCI-Frederick property in the southwestern section of Area A. Listing or eligibility for listing indicates that these areas of Fort Detrick need to be protected (32 CFR 800).

Similarly, historic properties and archaeological sites are provided special consideration under AR 200-2. Coordination with the SHPO would be required prior to development of these areas or areas adjacent to these historic and archaeological parcels. Adjacent land uses and associated activities should be consistent with maintaining these resources.

The following properties on Area A have been determined eligible for listing on the NRHP: Buildings 190, 375, 1301, 1302, 1303-06, 1412, 1414, 1415, and the tarmac. Building 190, the Boiler Plant, is located in the southwestern corner of Area A, south of Miller Street. Building 375, the SSP, is located at the western boundary of Area A. Buildings 1301, 1302, and 1303-06, constructed in 1956 to support research and testing by the Crops Research Division, are located in the central portion of Area A. Buildings 1412 and 1414, designed to support biological warfare research during the Cold War era, are located in the central portion of Area A, near Building 1520 (USAMRIID). The tarmac (actually composed of concrete) was a portion of an airfield in the southwestern portion of Area A built in 1939 and is now Hamilton Street.

A prominent feature of Area A is the AP transmission line which roughly divides all of Area A into north (one third) and south areas (two thirds). The associated right-of-way for the transmission line limits development and land use in adjacent areas. AP also has an easement for the substation being constructed adjacent to the USDA complex (Building 1301).

Limitations on the type of development and land uses for areas near the helipad, located in the south central portion of Area A, are related to the operational requirements for helicopter take-off and landing clearance. All of Area A is encircled by a security stand off buffer which restricts activities and land uses on the Installation boundaries.

Table 4-17. Parcels with Potential Restrictions on Area B of Fort Detrick.

PARCEL	APPROXIMATE AREA (Acres)	POTENTIAL ENVIRONMENTAL CONCERN	RESTRICTIONS
FTD-05 Test Grid	72.1	Area was used to observe the dissemination of biological simulants.	Restrict development pending determination of required remediation and land use restrictions in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Anticipate decision not requiring land use restrictions.
FTD-07 Area B-Ammo	15.1	Area was used to store explosives and develop test munitions for the simulant test grid.	Restrict development pending determination of required remediation and land use restrictions in accordance with CERCLA. Anticipate decision not requiring land use restrictions.
FTD-29 Skeet Range	32.8	Potential contamination from lead and polycyclic aromatic hydrocarbons (PAHs) associated with use of lead shot and clay pigeons, respectively.	Restrict development pending determination of additional testing and evaluation regarding required remediation and land use restrictions in accordance with CERCLA. Some soil remediation completed. Anticipate decision not requiring land use restrictions.
FTD-43 Area B-20 N and S	3.3	Areas were used for explosive disposal and small arm range.	Restrict development pending determination of required remediation and land use restrictions in accordance with CERCLA. Anticipate decision not requiring land use restrictions.
FTD-49 Area B-11	5	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.
FTD 50 Area B-2	2.6	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.
FTD 51 Area B-3 Inactive	1.6	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.
FTD 69 Area B-6,	5.9	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.
FDT 70 Area B-8	4.2	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.

Table 4-17. Parcels with Potential Restrictions on Area B of Fort Detrick (con't).

PARCEL	APPROXIMATE AREA (Acres)	POTENTIAL ENVIRONMENTAL CONCERN	RESTRICTIONS
FTD 71 Area B-10	5.3	Former disposal sites for a variety of wastes generated at Area A.	Parcel cannot be developed.
W-5 Wetland	1.0	Protected as a wetland.	Parcel cannot be developed or impacted.
Forested Area	38.1	Fort Detrick complies with the Maryland Forest Conservation Act as a matter of policy.	No clearing of existing forest. Group II or equivalent areas must be forested eventually; therefore, no development. Land use limited to low impact recreational activities.
Fort Detrick Municipal Landfill	60.9	Operating as a landfill.	Parcel cannot be developed.
Lime Kiln (18FR682)	400 square feet	Recognized and preserved by Fort Detrick; however, lacks archeological and structural integrity and does not possess the qualities of significance necessary for listing in the National Register of Historic Places (NRHP).	Parcel cannot be developed or disturbed.

Source: Gortva, 2003c.